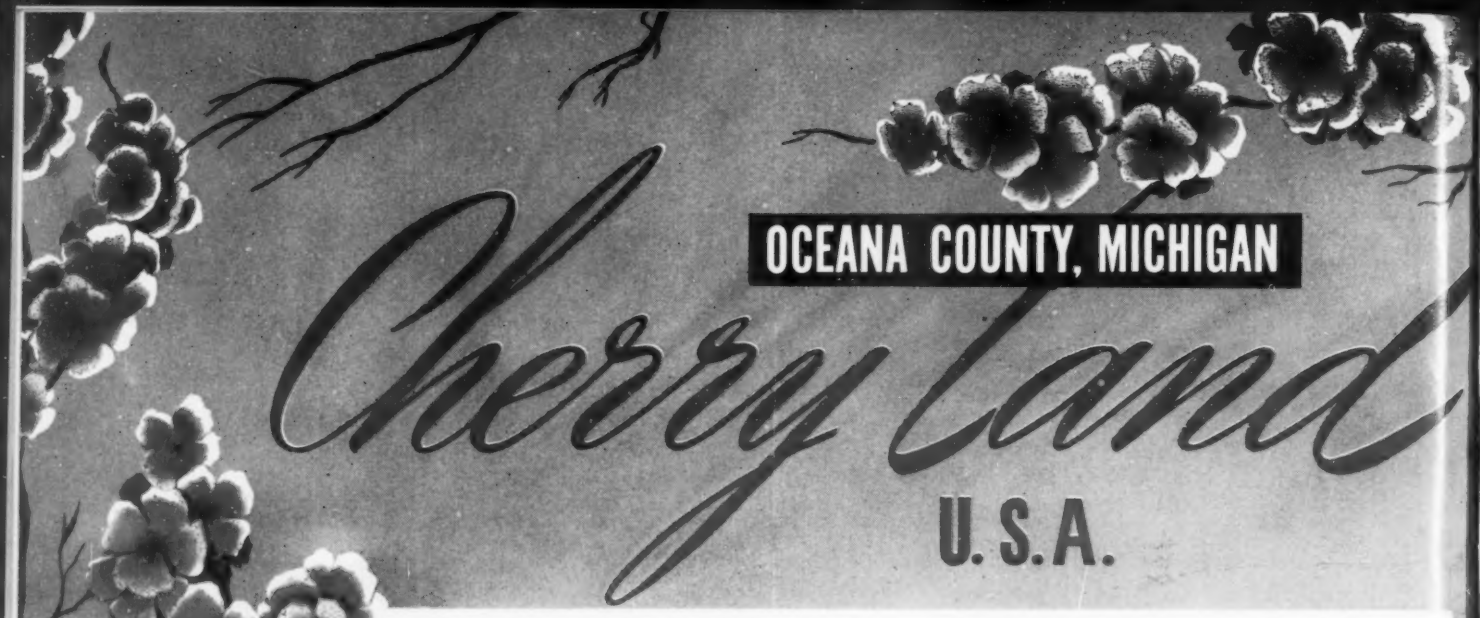
TELEPHONE ENGINEER and MANAGEMENT

AUGUST, 1949



Last year, Oceana County produced more than 20 million pounds of sweet and sour cherries. The majority of this fruit was processed and packed by the six canning companies in the county.

Hart, the seat of Oceana County, shares with the rest of the county the honor of being one of the largest cherry producing areas in the country but boasts singularly of having the largest single cherry grower in the world. Dr. L. P. Munger started growing cherries about 25 years ago as a hobby and now has over 400 acres in fruit bearing trees.

Cherry production is a specialized business that depends to a great extent upon geography and climate for success. In this respect it differs from successful telephone directory production. Success in directory publication depends on proper planning and skilled execution — with no regard for climate or geography. The application of Our Complete Directory Service Plan results in accurate, attractive, revenue-producing directories for the Michigan Associated Telephone Company which serves Oceana County, as well as for the Telephone Companies which serve in More Than 1200 Other Cities and Towns for which we publish directories.

Regardless of geography, regardless of climate, regardless of your problems —if you are not completely satisfied with your present directory publication procedure, you will be interested in having our representative explain what the application of Our Complete Directory Service Plan can do for your Company.

GENERAL TELEPHONE DIRECTORY COMPANY

Call collect or write to one of the offices listed below for a representative to contact you.

EASTERN OFFICES

185 North Wabash Avenue, Chicago 1, Illinois • Telephone—STate 2-5478
G. Daniel Baldwin Building, Erie, Pennsylvania • Telephone 2-4187
420 Columbia Street, LaFayette, Indiana • Telephone 4854
Washington Building, Madison, Wisconsin • Telephone—Fairchild 6026

WESTERN OFFICES

604 Pine Avenue, Long Beach 12, California • Telephone 6-7221
1220½ Texas Avenue, Lubbock, Texas • Telephone 2-6330
Peyton Building, Spokane, Washington • Telephone—Main 8644

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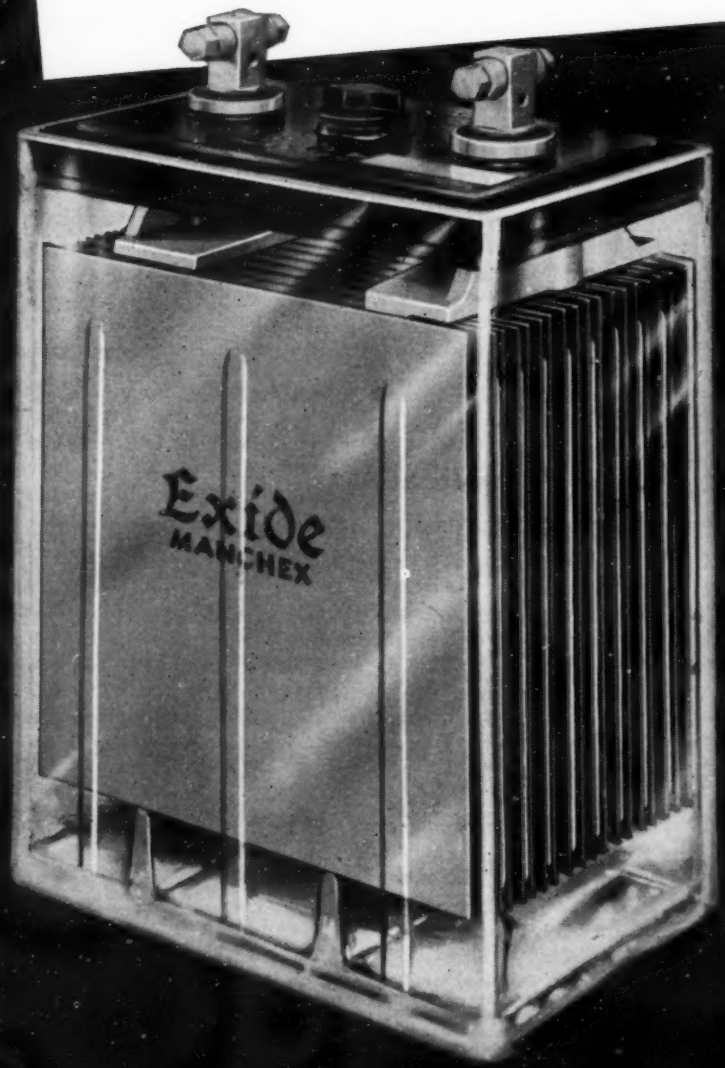
AUG 24 1949
DETROIT

THE NEW EXIDE-MANCHEX BATTERY

POWER . . . PERFORMANCE . . . ECONOMY

for Telephone Service



Exide
BATTERIES

An important feature of the new Exide-Manchex Battery is the famous manchester positive plate with its unique lead button construction. The buttons, rolled strips of corrugated lead, are pressed into holes of the lead-antimony grid. Forming action expands the buttons and locks them securely in place. Only a comparatively small portion of the total lead is formed initially into active material . . . the remainder is available for gradual conversion in service.

Negative plates, separators and other elements are designed to match the long life and efficiency of the positive plates. All combine to provide a battery of exceptional power and long-lasting, trouble-free performance.

Use Exide-Manchex Batteries for all stationary requirements—common battery, emergency reserve, signaling, PBX and other applications. Their use is assurance of dependability, long life and low cost maintenance.

1888

DEPENDABLE BATTERIES FOR 61 YEARS

1949

THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia 32

Exide Batteries of Canada, Limited, Toronto

"Exide" *Reg. Trade-mark U. S. Pat. Off.*

Across The Editor's Desk

Death came to two prominent Independent telephone men during the past fortnight. R. A. PHILLIPS, 44, president of the Central Telephone Company, died in Chicago, July 30, and Arlie C. Stuart, president of The Two States Telephone Co., Texarkana, Texas, died in Des Moines, Iowa on the same date.

Mr. Phillips was very active in affairs of the United States Independent Telephone Association having served as its president in 1942. His Committee work for USITA through the years was outstanding. See story on page. 54.

Mr. Stuart died following a heart attack aboard a train at Des Moines, Ia. He was enroute to Minnesota when stricken. Mr. Stuart was a telephone pioneer in Texas and his company is a monument to his achievements.

• • •

Reprint requests for privilege to reproduce the JOHN BOYLAN "Tales of the Nineties" stories appearing exclusively in TELEPHONE ENGINEER magazines continue to arrive. Mr. Boylan has granted requests to a number of publications, the latest being in the August issue of the Rochester (N.Y.) Engineer. His latest story "Nothing But the Truth" appeared in the August 1 issue of Fortnightly.

• • •

In our September issue we will announce a new writer on our Staff. He will specialize his writings on the problems of the small companies from actual experiences as he is an active operating telephone man. His company faces the same problems that thousands of the smaller Independents now find so vexing and will outline his methods of solving them.

• • •

JACK HALEY, secretary of the Texas Telephone Association, has notified us their 1950 convention city will be San Antonio. Jack has plans for an air visit to Mexico City for those attending immediately after adjournment of the sessions.

The National Telephone Magazine

TELEPHONE ENGINEER and MANAGEMENT

AUGUST, 1949 **VOL. 53, NUMBER 8**

Editor, RAY W. SMITH • *Advertising Director*, ROY F. SMITH
Managing Editor, JOHN G. REYNOLDS • *Promotion Manager*, DON C. SORENSEN
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FRONT COVER: Art Goetting, Cable Supervisor of the La Crosse (Wis.) Telephone Corp., viewing three muslin and paraffin-jacketed half-tap splices which have been completed. The cables in the foreground are the working cables now terminating on the old main frame, while the cables on the left-hand side of the picture constitute the 1212 pair which were tapped in the old cable while the cable was in service. There was no interruption in service while the work was being completed.

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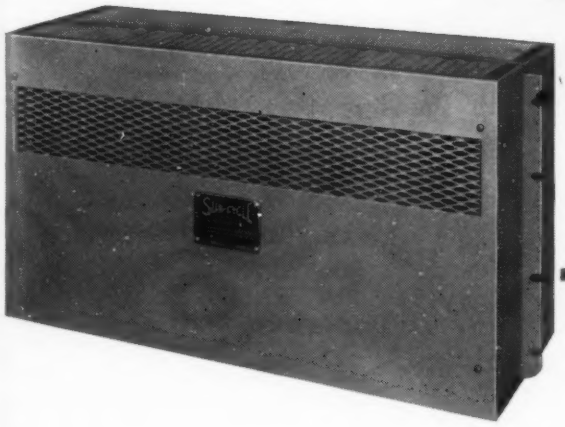
You Can Depend Absolutely on

LORAIN K-5 SUB-CYCLE RINGING CONVERTER

(ESPECIALLY DESIGNED FOR "DECIMONIC" RINGING SYSTEMS)



DELIVERING EXACT RINGING FREQUENCIES AT ALL TIMES FOR

5 Party Full Selective Ringing (Metallic)
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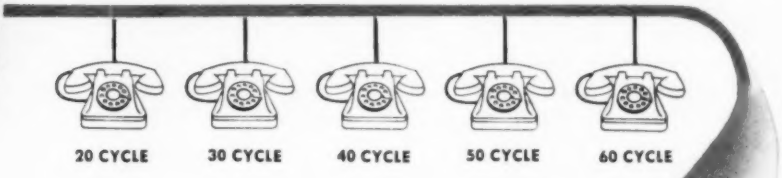
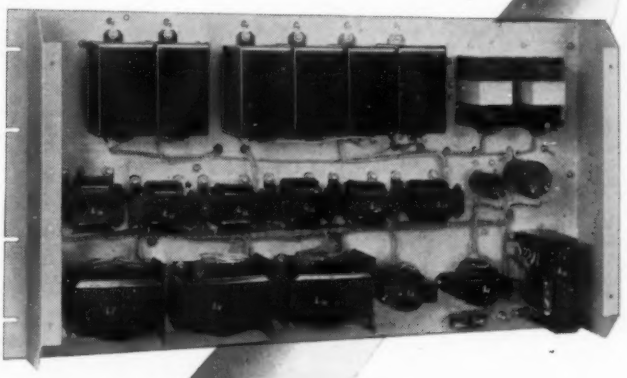
10 Party Semi Selective Ringing (Metallic)



The Model K-5 Sub-Cycle operates from 105-125 volts 60 cycles, and generates ringing frequencies of 20, 30, 40, 50 and 60 cycles. The ringing frequencies are locked to the 60-cycle power supply and cannot shift. There are no moving parts and no adjustments. It provides ample power for small or large offices.



SOME OF THE MANY ADVANTAGES "K-5" SUB-CYCLE GIVES YOU ARE

- Reduces maintenance to a minimum
- Supplies permanently accurate ringing frequencies
- Supplies closely regulated ringing voltages
- Low in cost—requires very little power to operate
- Self-starting—has no starting relays
- Can be operated on a start-stop basis
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- Is compact and easy to install
- Is virtually tamper proof
- Cannot introduce noise into the talking battery
- Will not introduce noise or cross-talk in the cables

SOLD THROUGH LEADING TELEPHONE DISTRIBUTORS

Write for Bulletin No. 157

DEPT. "L"

LORAIN PRODUCTS CORPORATION • LORAIN, OHIO

DESIGNERS AND MANUFACTURERS OF SUB-CYCLE AND FLOTROL

Free Literature Department

New Product Literature of Practical Interest

All literature described in this department may be obtained by sending in the handy blank at the bottom of this page.

AIR CIRCULATOR: New folder describes a modern air circulator known as the "Guthfan." "Guthfans" offer the original "Complete Cycle" circulation. They pull up the cooler lower air and circulate it in all directions and provide three times more circulation than a conventional 16" fan.—*Request FL326.*

DESK CHART:—Cannon Electric has issued its 1949 chart of insert arrangements of the Type "K" Series of electric connectors. The desk chart shows the insert arrangements half scale, and measures 19 by 24 inches. The full scale chart measures 36 by 48 inches. The chart contains 211 layouts, with wire, contact and clearance data. The major shell types and styles are illustrated with one exploded view.—*Request FL327.*

GRAPHIC RECORDERS:—New bulletin describes Models FR and FRA graphic recorders, manufactured by Sound Apparatus Co. The bulletin points out the time saving applications of the instrument in recording the frequency response characteristics of electra acoustical and electronic apparatus; shows typical applications, complete specifications and principles of operation. *Request FL328.*

INSULATION MEASUREMENT:—Four-page bulletin describes and illustrates "Vibrotest"; lists capacities and specifications of all models from 100 to 50,000 megohms; discusses advantages of self-contained power unit eliminating hand cranking. Chart of "Vibrotest" models makes a handy base specification table for all insulation-testing instruments.—*Request FL329.*

RECORD HANDLING: New folder provides detailed information on patented method of rolling active records to a seated operator. Office managers, controllers, treasurers and systems men will be interested in the features of Rol-Dex, the custom made housing for active records which are used for reference or posting. Horizontal rolling carriages at desk level bring records to a seated operator enabling her to be occupied full time without moving from her station.

Rol-Dex aids management by making it possible to set work standards, fix responsibility and measure results. It reduces costly clerical labor turnover since filing operations are no longer a menial task. The improved morale and reduced fatigue cuts errors, increases production, assists in obtaining and keeping better help.—*Request FL330.*

RECTIFILTER:—New descriptive literature on Raytheon Rectifilters includes illustrations, diagrams, schematics, and full specifications of the new Raytheon Rectifilter.—*Request FL331.*

SUPERVISORY TRAINING:—Purpose of this report is to provide executives interested in supervisory training with actual and specific examples of how other companies train their supervisors, so that they may have a means of comparing their own methods and practices with those used in successful programs in other companies.

The executives cooperating describe phases of their own or their companies' experience in supervisory training. Here are the subjects they discuss in original signed articles: Supervisory Training Programs; Improving Group Discussion as an Aid in Attaining Management Objectives; Training by Lecture-Discussion; Determining Individual Supervisory Training Needs; Initial Training for the New Supervisor; An Executive Development Program; An Education and Training Program for Supervisors; Supervisory Training in Small Operating Units; Developing Leadership; and Multiple-Management's Role in Training.—*Request FL332.*

UNIVERSAL TESTER:—Ultra-precision in four individual ranges permits the operator of the Dillon Multi-Low-Range Universal Tester to obtain close readings on its 8" dial. The scale is available in ounces, tenths pound, or kilos, four divisions each, with scale in different colors. A new bulletin M on this remarkable instrument has been issued by the manufacturer, W. C. Dillon & Co., Inc. Full description of the simple operation of the tester, with photographs of all parts, make this a most informative bulletin.—*Request FL333.*

SEND IN THIS COUPON FOR MORE INFORMATION

Telephone Engineer Publishing Corp.
7720 N. Sheridan Road
Chicago 26, Illinois

Please forward the following literature described in the August, 1949 issue of TELEPHONE ENGINEER AND MANAGEMENT. (Check information desired.)

FREE LITERATURE

FL 326..... FL 327..... FL 328..... FL 329.....
FL 330..... FL 331..... FL 332..... FL 333.....

Name ..... **Title** .....

Company .....

Street Address .....

Town ..... **Zone** ..... **State** .....

Barber-Greene

720 Ditcher

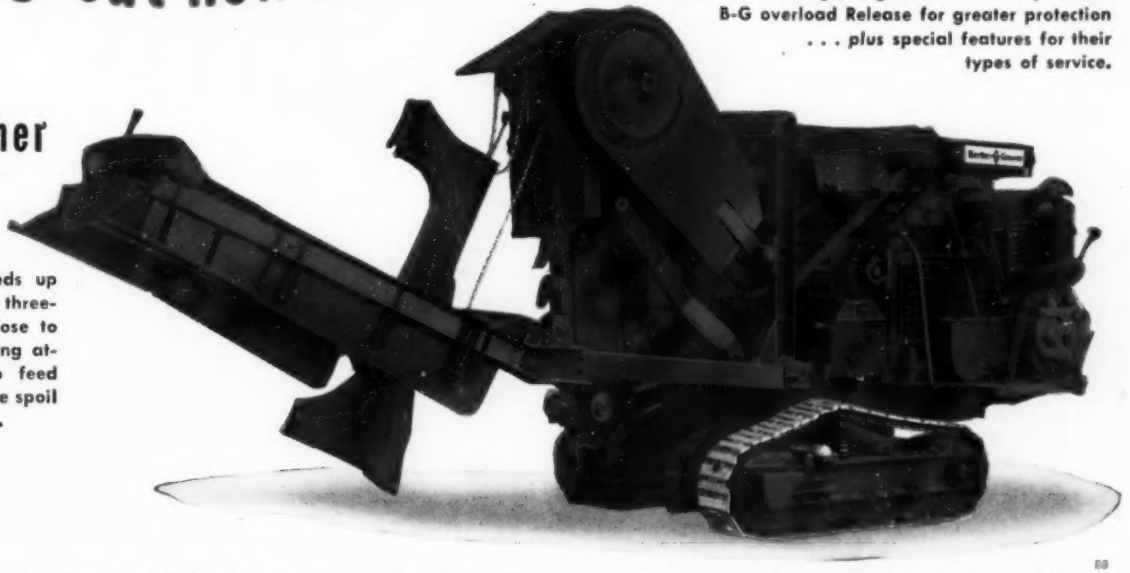
For digging trenches 8" to 11" wide—up to 4 feet in depth. Digging speeds up to 32 F.P.M.; traveling speeds as high as 234 F.P.M. adjustable spoils conveyor discharges on either side. Three-position boom adjustable to dig close to obstructions. Simple B-G controls, easy-steering.

Two great new ditchers in the B.G. line!

These two new ditchers bring exclusive, time-proved B-G advantages . . . the B-G Vertical Boom that digs straight down, leaves no ramp . . . close-spaced, self-cleaning buckets that *cut*, like a milling machine, into toughest ground . . . the patented B-G overload Release for greater protection . . . *plus* special features for their types of service.

710 Ditcher

Digs trenches 5½" wide up to 42" deep. Digging speeds up to 32 F.P.M.; travel speeds up to 234 F.P.M. Vertical three-position boom digs close to obstructions. Cable-laying attachment available to feed cable and plow over the spoil in one continuous pass.

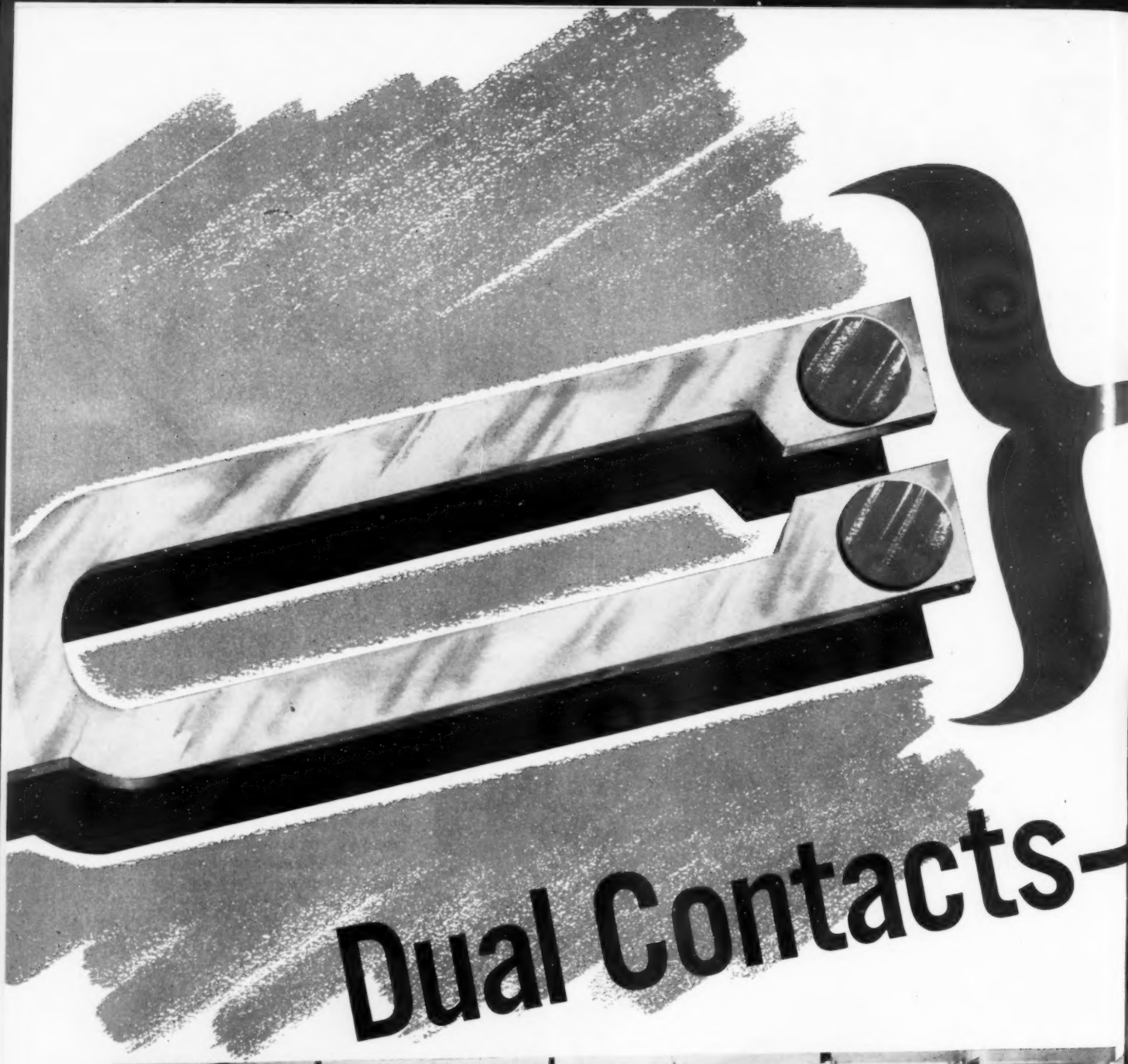


Ask your Barber-Greene distributor for full details on the B-G Ditcher which interests you — or write to Barber-Greene Company, Aurora, Illinois.

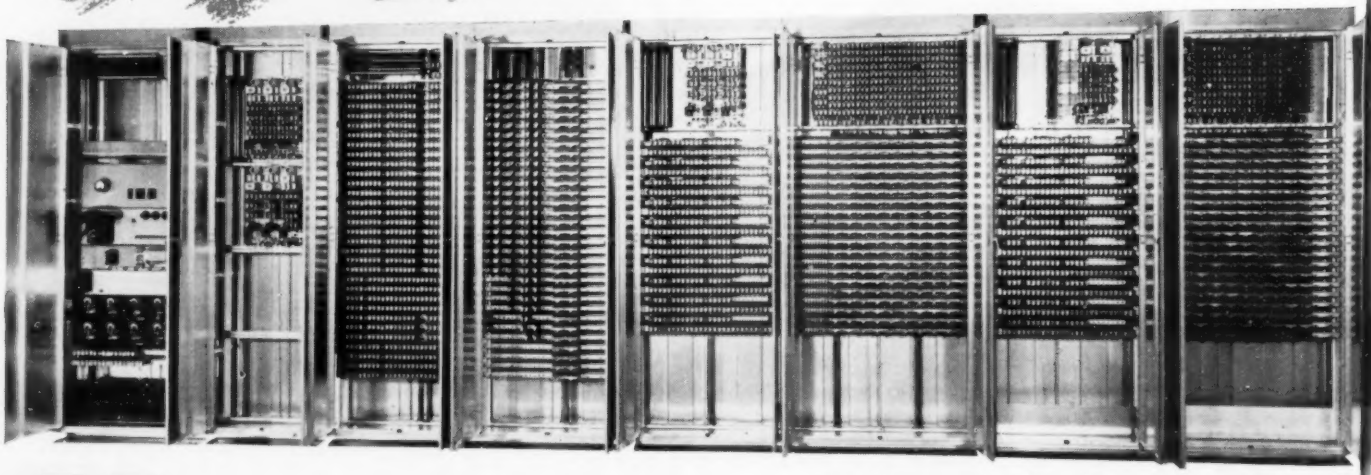
BARBER · GREENE COMPANY · AURORA, ILLINOIS

Constant flow Equipment

LOADERS · PERMANENT CONVEYORS · PORTABLE CONVEYORS · COAL MACHINES · BITUMINOUS PLANTS · FINISHERS · DITCHERS



Dual Contacts—



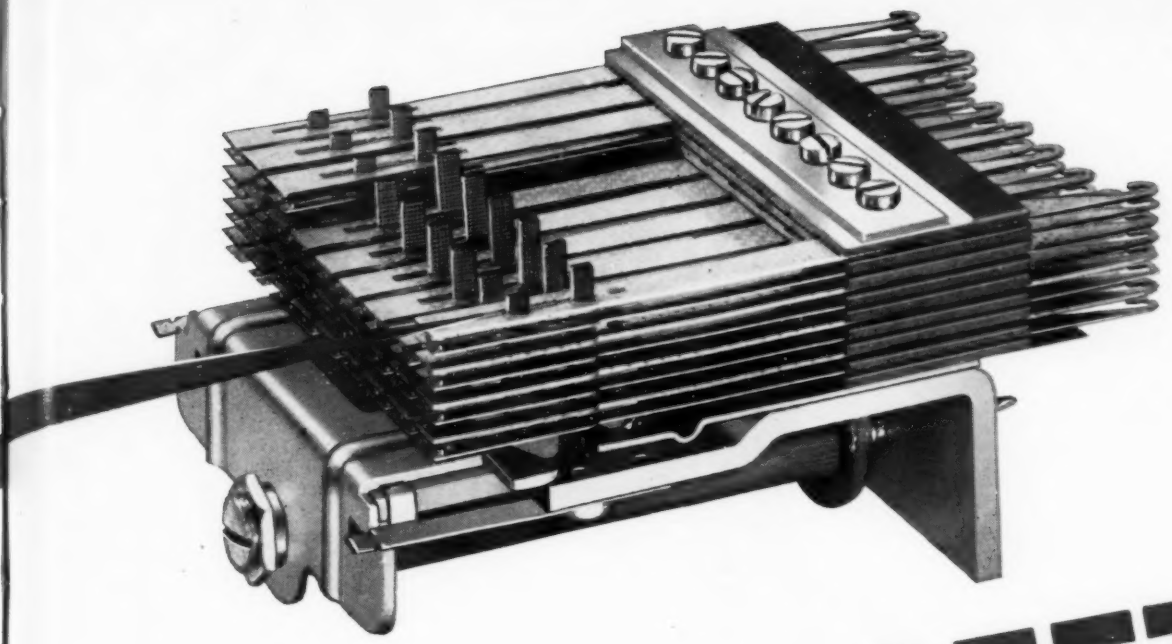
Partial Equipment for a 3000-line "Selector" Relaymatic

KELLOGG SWITCHBOARD AND SUPPLY COMPANY

Established-1897

RELAYMATIC SWITCHBOARD

6650 SOUTH CICERO AVENUE • CHICAGO



DOUBLE SAFETY!

That's why You're Sure of ABSOLUTE DEPENDABILITY with Kellogg Relaymatic Switchboard

Twin contacts of arc-resisting, precious metal on each Relaymatic relay spring insure a positive connection on every switching operation. Their efficient functioning improves transmission and increases dialing range. Nickel-silver relay springs maintain uniform tension, and the high-grade insulation is unaffected by crackling sub-zero cold or steaming tropical humidity. That's why Kellogg relays are dependable! And that's why Relaymatic is reliable, for it uses *relays only.*

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Send Coupon NOW For Full Details!

Kellogg Switchboard and Supply Company
6650 So. Cicero Ave., Chicago 38, Ill.

Please send complete data on your Relaymatic Switchboards.

NAME: .....

COMPANY: .....

ADDRESS: .....

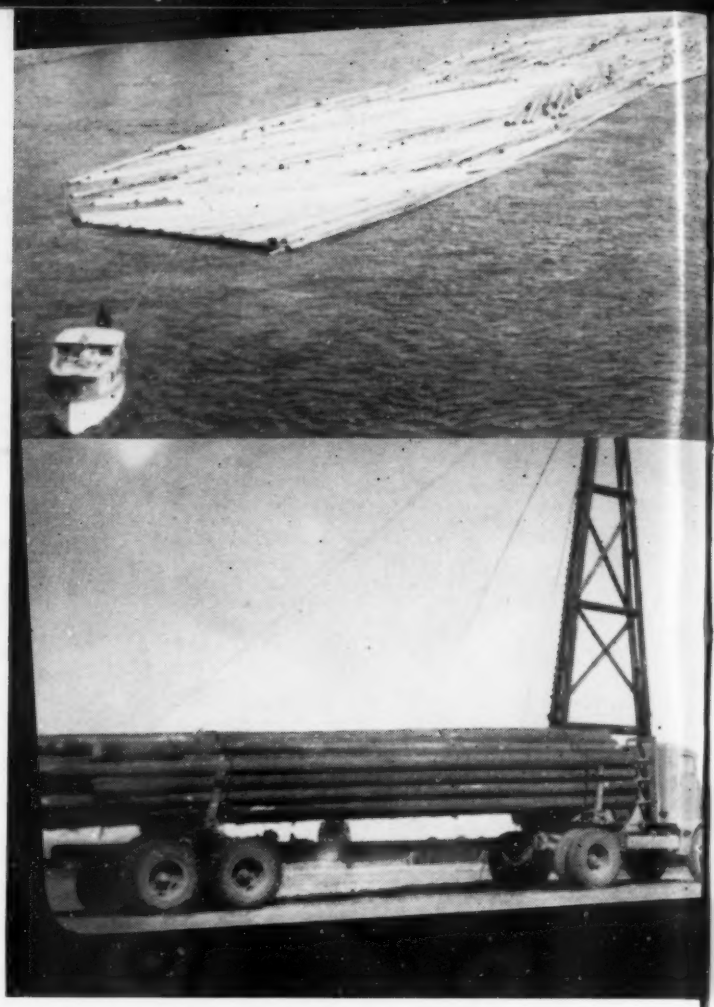
TOWN: ..... STATE: .....

Successful INDEPENDENT TELEPHONE MAN Says:

H. W. VAUGHAN
Chickamauga Telephone Co.
Chickamauga, Ga.

"Kellogg's prompt, efficient and courteous service means a lot to the Independent telephone man, especially under today's conditions. You can rely on them."

Non-rusting, Extra Strong, Copperweld Line Wire is the only wire combining the strength of steel with the high conductivity and rust-resistance of copper. Its strong, alloy-steel core is covered by a thick, molten-welded copper covering. For long life and finer telephony, specify Copperweld, made by the COPPERWELD STEEL COMPANY.



Famous for Strength and Durability, Northern White and Western Red Cedar poles flow toward the MAC GILLIS & GIBBS CO. plants in a steady stream, by water, truck and rail. There they're processed and creosote-treated to insure longer service life. Order MacGillis & Gibbs poles next time and watch your replacement costs drop!

for EASIER ORDERING PROMPT HANDLING QUICK SHIPMENTS

...send your next order to KELLOGG

When you order from Kellogg, you fill out just ONE order form for *all* your line supplies. Saves you time and work! Then your order gets prompt attention by experienced telephone men. No chance for slip-ups here! Finally, we ship quickly, from the distribution point nearest you. It's fast, sure service, and every item is *guaranteed!*

For Service from a Nearby Distribution Point, Order Your Line Supplies from:

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Factory and General Offices: 6650 SOUTH CICERO AVENUE, CHICAGO 38, ILL.
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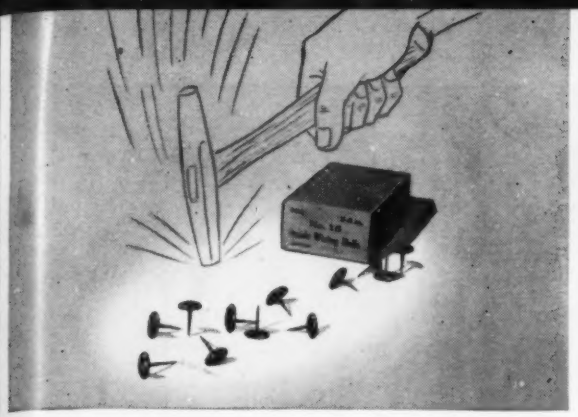
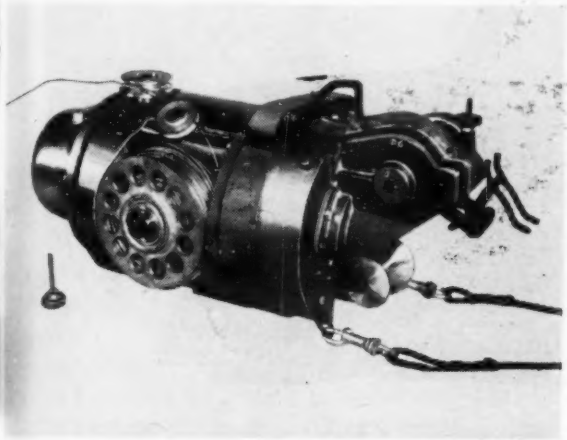
ALL OF THE ABOVE ITEMS MAY BE QUICKLY AND CONVENIENTLY ORDERED FR



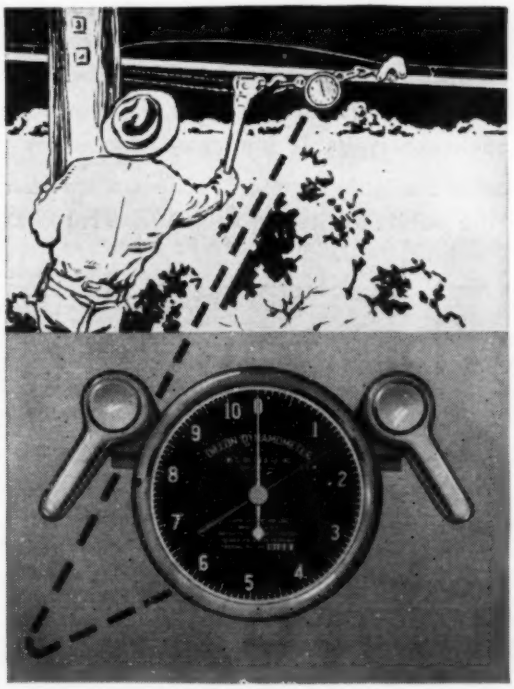
Why Do It The Hard Way? Making neat installations is *easy*—with Rhodes Telephone Wiring Nails! Designed for telephone work with quality insured by rigorous driving, bending, withdrawing and immersion tests. Made by M. M. RHODES & SONS CO., in several colors and pin-lengths.



Designed for Fast, Low-Cost New Construction, the Neale Model "D" Cable Spinner is compact, light and built rugged. Spins an evenly-spaced spiral under steady tension. Ratchet lock prevents slack in spinning wire when pull on tow line is released. Made by CABLE SPINNING EQUIPMENT CO.

"City of Chicago is almost utterly destroyed by fire," telegraphed Gen. Sheridan from the flame-swept city, Oct. 9, 1871. Serving through many such historical moments, Hemingray Insulators have kept pace with communications needs. Today, made by AMERICAN STRUCTURAL PRODUCTS CO., they are accepted as standard by the industry.

…rable and Silent. The Sub-Cycle Ringing …nverter changes frequency without any mov…g parts. As a result, wear and consequent ad…stment and maintenance are virtually elim…ated. This LORAIN PRODUCTS CORP. …atic-type converter comes in several models.



Guard Against Overstrain and wire service failures with the Dillon Dynamometer. Registers exact load in pounds on wire, messenger or guy strand, helps prevent devitalization of wires due to overstrain. Small, light, easy-to-use, it's a product of W. C. DILLON & CO., INC.

Prompt Delivery! Available *now*, for use with modern cable spinners, is Crapo Galvanized Steel Lashing Wire. Heavily-galvanized; .091" dia., 325' coils. "Stainless Steel" Lashing Wire (.045" and 0.65" dia.) also shipped promptly. Products of INDIANA STEEL & WIRE CO.

POWERS GENERAL SERVICE BODIES

The versatility of these POWERS Bodies permits them to be used for gas, telephone, water and electric service; street light maintenance, and other types of general service work. Large, weather-tight compartments are fitted with shelves, parts bins, and material hooks to provide facilities for the tools, supplies, and equipment required on almost any job. Standard models are available for installation on ½, ¾, and 1 ton chassis.

POWERS Bodies are also available for construction, maintenance, and service operations in all phases of the public utility industry. Write for complete information.

SERIES 700-C — Forestry Body. Crew compartment comfortably accommodates four men. Winch and derrick optional.

AD-10—Pole Dinkey. Has 1 ton capacity. Other models having capacities up to 5 ton are also available.

SERIES 500 — Line Construction and Maintenance Body. Various models are available for all standard truck chassis.

ALL-STEEL POWERS PUBLIC UTILITY BODIES

UTILITY BODY DIVISION
McCABE-POWERS AUTO BODY CO.
5900 N. BROADWAY • ST. LOUIS 15, MO.

NEWSLETTER
TELEPHONE ENGINEER

Fortnightly TELEPHONE ENGINEER ★ TELEPHONE ENGINEER AND *Management*

ON THE 1st OF EACH MONTH ON THE 15th OF EACH MONTH

NEWSLETTERS *on Alternate Weeks*

Dear Sir: August 15, 1949

Telephone revenues seem to have been affected only slightly—and in many places not at all—so far by present so-called business recession. Experienced telephone analysts say points to watch, for signs of slipping are toll revenues from non-business telephones, rate of telephone take-outs and firmness of held orders. As to latter, some telephone companies report held orders only 50% to 69% firm now, as compared with around 80% at beginning of year.

* * *

As TELEPHONE ENGINEER & MANAGEMENT went to press Senate Agriculture Committee was holding hearings to obtain views of telephone industry, Bell & Independent, on Hill Rural Telephone Bill. Representatives of Independent industry appearing Aug. 8-9 included Frank S. Barnes, USITA pres.; R. A. Lumpkin, pres., Illinois Consolidated Tel. Co., Mattoon, Ill.; Carl D. Brorein, pres., Peninsular Tel. Co., Tampa, Fla.; La Mar Stoops, mgr. Nappanee (Ind.) Tel. Co.; Clyde McFarlin, pres.; Montezuma (Ia.) Tel. Co.; Warren Clay, mgr., Hutchinson (Minn.) Tel. Co.; W. G. Winters, Hull (Tex.) Tel. Co.

Mr. Brorein recommended 3 changes in proposed legislation, namely (1) Reconstruction Finance Corp., rather than REA, should handle rural telephone service loans; (2) bar loans that would result in duplicate services unless existing companies were unable or unwilling to extend service; (3) "public bodies" (meaning government agencies) be stricken from list of those eligible to receive loans. (See our Washington Report, page 31 of this issue for full story)

* * *

"Phonevision" moved step closer to consumer August 4 as Zenith Radio Corp. applied to Federal Communications Commission for permission to make trial run. Company announced it hopes to make test this fall in Chicago area. Illinois Bell Tel. Co. disclosed that at recent meeting with Zenith officials agreement to cooperate on project was reached. Bell spokesmen said intensive study of costs involved in providing leased channels for tests is being made, as well as of all other cost phases of process.

With "phonevision" attachments on their telephones & receivers, television set owners could call their operator, ask for unscrambling device to be set in action which would permit reception of first-run movies, plays & other events too expensive for television advertisers. Charge would be made on telephone bill.

* * *

Florida and New Mexico Commissions granted rate increases respectively to Southern Bell and Mountain States Tel. & Tel. Co. Florida Commission's approval of a $2,406,000 increase was about half of what company had requested.

The Mountain States Tel. & Tel. in winning approval of New Mexico Commission will be able to put into effect tariffs filed last May 11, which will yield on present volume of business an increase in gross reven-

ues amounting to approximately $730,000 a year. While it gained approval of increase in New Mexico, Mountain States Tel. & Tel. Co. received setback in Arizona where state commission issued order July 29 denying completely its "second round" application, filed last Jan. 27, for $122,000 monthly increased gross revenues. The company has announced that it intends to file petition for rehearing.

Indiana Bell Telephone Co. suffered adverse decision from its state commission, which denied Aug. 4 its application for temporary rate increase to yield $3.8 million additional annual revenues. Indiana Commission held company had failed to show emergency situation & ordered hearings resumed Sept. 12 on petition for permanent rate increase which had been filed by Indiana Bell Nov. 19, 1948.

* * *

A total of $66 million in new construction activity was reported by the Commerce Department for the telephone and telegraph industries August 3. This figure was 6% or $4 million higher than the $62 million expenditure in June and was one million dollars, or 2%, more than July, 1948, with a figure of $65 million. Virtually all of new construction was performed in telephone industry.

The first seven months of 1949 which totaled $396 million was 4% less than the comparable seven months of 1948 with a listing of $412 million.

* * *

Highlights: Citizens Tel. Co. converted Monroe, Ind., exchange to automatic operation . . . J. B. (Burt) Patterson, Randolph, N. Y., retired from duties with Jamestown (N. Y.) Tel. Corp.; had 45 years industry service . . . Coachella Valley Home Tel. Co., Thermal, Cal., announced it has expanded over 100% since War's end; company installed 1,400 telephones in 1st 39 years of existence; installed next 1,400 in less than 4 years . . . Walworth County Tel. Co. building new lines from Selby, S. D., to Lowry & Alaska, S. D. . . . Charles Stone appointed mgr., Chilton, Tex. exchange of Three States Tel. Co.

Ozark Central Tel. Co. completed cutover of Eldon, Mo., exchange to automatic operation . . . Humboldt, Neb., converted to automatic operation by Lincoln (Neb.) T. & T. Co. . . . New Ulm (Minn.) Review on July 21 paid tribute to New Ulm Rural Tel. Co.; reviewed history of company which has served community for 44 years . . . The Thermal Belt Tel. Co., Tryon, N. C., completed installation of new circuits between Tryon & Landrum.

Newly organized Frederic (Wis.) Tel. purchased Frederic exchange from Equity Tel. Co. . . . Paul S. Killian elected vice pres. in charge of purchasing Bethlehem Steel Co.; succeeds late Charles R. Holton . . . Virginia Independent Tel. Assn. will hold its annual convention Oct. 20-21, Hotel Chamberlain, Old Point Comfort, Va. . . . Alabama Independent Tel. Assn., meets Nov., 17-18, Jefferson Davis Hotel, Montgomery, Ala. . . . Texas Tel. Assn. announced 1950 convention will be held March 6, 7, 8, Plaza Hotel, San Antonio . . . Southwestern Associated Tel. Co. converting Boytown, Tex., exchange to automatic operation.

Ray W. Smith, Editor

THE WHITNEY BLAKE BULLETIN

Distributed by Graybar

THE STORY OF TELESEAL

Teleseal Underground and Communication Wire is a great companion to the Teleprene line of aerial communication wires. Teleseal was developed for long service in wet locations or for *direct burial underground* where rodents are not a serious problem. Teleseal provides long and dependable trouble-free communication service under these severe conditions.

Teleseal is physically stable. Its service life is greater than provided by deproteinized rubber insulations. Teleseal is electrically stable. Its characteristics are the same in wet or dry weather, compared to an increase of transmission losses of 50 to 100% for weatherproof drop wire in wet weather.

CONSTRUCTION

Teleseal is manufactured with the Whitney Blake Teleplate coating on the conductors. This consists of an electrolytic lead plate for corrosion resistance and brass plate over the lead to secure enduring adhesion.

The insulation on Teleseal consists of a specially developed GR-S low moisture absorbing compound equivalent in resistance to moisture absorption and in electrical stability to a pre-war 60% submarine cable insulation. This compound is responsible for the low transmission losses at telephone frequencies and the long underwater stability shown in the following test data.

Over the insulation and adherent to it as a Neoprene tire tread type jacket identical in composition with that used on Teleprene drop wire. This jacket incorporates the proven advantages of sunlight, ozone, flame, and water resistance, as well as great toughness and abrasion resistance. It provides continuing protection against the harmful effects of oils and grease as well as the corrosive action of acids from cinders.

SIZES

Teleseal is available in sizes as listed in the table below:

Catalog No.	TYPE	Nominal O.D. Each Conductor
1353	#16 Single, Hard Copper	0.203"
1351	#16 Twisted Pair, Hard Copper	
1352	#14 Single, Hard Copper	0.238"
1350	#14 Twisted Pair, Hard Copper	
1359	#12 Single, Hard Copper	0.265"
1358	#12 Twisted Pair, Hard Copper	

TEST DATA

The measured physical and electrical characteristics of Teleseal wire are as follows:

COMPRESSION RESISTANCE — POUNDS*

	#16	#14
Unaged	1050	1410
Aged 4 Days at 70°C. and 300 pounds oxygen	900	1490
Aged 7 Days at 70°C. and 300 pounds oxygen	880	1520
Aged 10 Days at 70°C. and 300 pounds oxygen	850	1300
Aged 7 Days at 70°C. in air	1010	1350
Aged 14 Days at 70°C. in air	1080	1340

*Compression Resistance tests are usually made with 2 inch compression jaws. These tests were made with 1 inch jaws, thus reducing the usual values by 50 per cent since the capacity of the testing machine is only 2000 pounds.

WATER ABSORPTION AT 158°F. Per cent increase in capacity after continuous immersion in water at 158°F. Per cent changes based on capacity measurements made after 1 day immersion. 1000 cycle electrical measurements.

After 8 day immersion	1.0%
After 29 day immersion	5.2%

MUTUAL CAPACITANCE, Microfarads per 1000 feet at 1000 cycles. Immersion in water at 80°F.

	Dry in Air	Immediately After Immersion	After 295 Days Immersion
Catalog No. 1350 #14 Teleseal	0.0268	0.0294	0.0296
Catalog No. 1351 #16 Teleseal	0.0231	0.0283	0.0288

	In Air		Immediately After Immersion	After 295 Days Immersion
	Dry Weather	Wet Weather		
Catalog No. 1350 #14 Teleseal	0.151	0.154	0.158	0.159
Catalog No. 1351 #16 Teleseal	0.190	0.200	0.207	0.210

DIELECTRIC STRENGTH, Volts to breakdown in water.

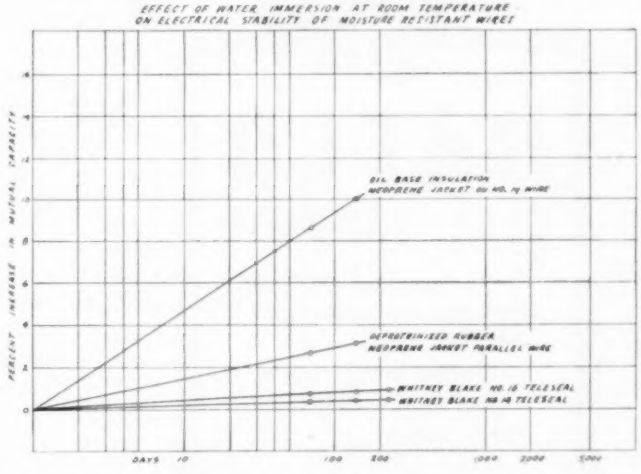
Catalog No. 1350 #14 Teleseal	24,750
Catalog No. 1351 #16 Teleseal	17,250

INSULATION RESISTANCE, Megohms per 1000 feet after 12 hours immersion in water.

Catalog No. 1350 #14 Teleseal	18,200
Catalog No. 1351 #16 Teleseal	22,300

Data on the excellent performance characteristics of Teleseal at high frequencies is also available.

The test results outlined above offer clear proof that there is no better wire than Teleseal for long service in wet locations or for direct burial underground.


EFFECT OF WATER IMMERSION AT ROOM TEMPERATURE ON ELECTRICAL STABILITY OF MOISTURE RESISTANT WIRES
OIL BASE INSULATION NEOPRENE JACKET ON NO. 19 WIRE
DEPROTEINIZED RUBBER NEOPRENE JACKET PARALLEL WIRE
WHITNEY BLAKE NO. 19 TELESEAL
WHITNEY BLAKE NO. 16 TELESEAL
DAYS

Reprints of this advertisement are available on request.

THE WHITNEY BLAKE CO., BOX K, HAMDEN, CONN.

NO. 6109-D

PONY PINTYPE
$37.50 Per M
F. O. B. Factory

ORDER NOW

Finest Quality Electrical Porcelain, Brown Glaze, One Inch Threaded Pin Hole. 2-3/16" Diameter, 3-1/8" High. You'll Like Them. Satisfaction Guaranteed.

and for Perfect
INSTALLATION SERVICE

Made to guarantee top quality in insulation and top performance on your telephone installations. A complete and diversified line with each item especially engineered and produced to exacting specifications for telephone service.

Sold through your jobber. Write direct if he does not carry the P.P. line.

SCREW EYES

C KNOBS

S KNOBS

T KNOBS

No. 6062

STRAINS TREE KNOBS No. 4-2 GR. TUBES

PORCELAIN PRODUCTS, INC.
FINDLAY, OHIO

SINCE 1889

NATCO
CLAY CONDUIT

The proved and standard Protection for Underground Telephone Cables.

Cheapest in the long run. Highest quality and a full line of shapes.

National Fireproofing Corp.
202 E. OHIO STREET, N. S.
PITTSBURGH, PA.

THAT'S ODD!

By W. Ray Clapp

SHORTS, crosses, grounds and opens may sound like a mouthful of miscellaneous fugitives from the dictionary to the public. But they mean something to a trouble shooter. Most of the service calls crowded into his busy day can be classified under those headings.

And so it is with quite another type of trouble shooter in the telephone business—the chief special agent. Although shorts, crosses, grounds and opens mean different things to him, they spell trouble just the same.

In case you're wondering how all this adds up, listen!

Not long ago, the telephone rang, and a woman at the other end of the line complained that she was "short" one telephone. It had been stolen from her home at about 8 o'clock that morning. She was tired of talking to herself, she said, and wanted her telephone back.

"Were you in the house when the theft occurred?" asked the Special Agent, who took the call.

"Yes, I was," the lady replied. "And this isn't the first time it's happened, either."

After further questioning, the caller reluctantly suggested, "If you call my husband at his office, he might give you a lead."

So the agent did, and the husband did.

He, too, was tired—tired of having his wife "spend the whole day on the telephone." So, he just disconnected the thing every morning and took it to work with him, then hooked it up again at night.

Speaking of crosses. . . One day a call came in from a woman who really had her wires crossed. She complained that the incessant ringing of her telephone was driving her mad. After lending a sympathetic ear, the chief decided to go out and hear the "serenade of the bells" for himself.

"Just listen to that telephone," the lady urged.

The chief listened. He didn't hear a sound. There was no telephone in the house. On the way back to the office, he dropped into a drugstore and dashed himself against a glass of water and an aspirin.

As for grounds. . . A farmer along a coaxial route claimed the cable plow had cut a hole in the ground and let his spring run dry. And that, he argued, is "grounds" for complaint.

Another time, a call came in from a telephone repairman who wanted to be grounded. A dog had him treed up a terminal pole, and he couldn't get down. The humane society was summoned to chase the dog away.

Now, about opens. . . No trouble shooter ever had more grief with this particular brand of trouble than the chief special agent's department. According to one lady farmer, the construction forces left a gate open, and her Jersey bull had visited the neighbor's cow.

On another occasion, a cow got through a barricade into an open splicing pit, and later died. The owner claimed its death was due to pneumonia, contracted while in the pit.

Then there were the ducks which died, according to a farmer's claim, "after swimming in the impure water in a splicing pit." Another farmer said two of his sheep succumbed as a result of coaxial cable operations on his property. He filed a claim for six sheep, because the ewes were "expecting" and he fully anticipated a set of twins from each one.

An opening for conduit in a city street brought a claim from a property owner that the new cable had electrocuted her walnut tree, 20 feet away.

Well, that should be enough to prove that if the chief special agent sometimes screams like a Comanche, it's probably because people seem so anxious to put the "Indian Sign" on him!—(PACIFIC BELL MAGAZINE.)

ROCHESTER COMPLETES FIRST STAGE OF CITY-WIDE CONVERSION PLAN!

Rochester Telephone Corporation's 3rd Cut-over Brings

Federal's 7A-2

Rotary Dial Service to Entire Downtown Area

J. W. Morrison, President, pulls plug to cut over Locust office. Left to right: F. C. Goodwin, Jr., Sec'y and Treasurer; J. E. Wyckoff, Commercial Supt.; G. W. Miller, Chief Engineer; D. H. Campbell, Exec. Vice President; W. Hatton of Federal; W. A. Kern, Vice President; Mr. Morrison and A. S. Gibson, Auditor.

Subscribers Now Working with Dial Total 15,462 Lines and 40,682 Stations

ROCHESTER TELEPHONE CORPORATION (N. Y.) made its 3rd cut-over to Federal 7A-2 Rotary dial switching equipment on June 25, 1949, thus concluding the initial stage of its proposed plan for converting the 136,700 Rochester stations from manual to automatic.

Main Manual Office A and B boards eliminated by Federal 7A-2 Rotary

The latest cut-over eliminated the former Stone and Main manual offices and added the Locust dial exchange to the first three installed by Federal —Baker, Hamilton and Empire.

ROCHESTER—America's first major Rotary installation—now has 15,462 lines of Federal Rotary equipment serving 40,682 stations—including many leading industrial firms, as well as the central shopping and banking district of Rochester.

Interesting brochures and booklets on Rochester's unique Rotary installation are available. Write today for copies—and attractive delivery dates on Federal's complete line of both Rotary and Step-by-Step dial switching equipment.

Address Telephone Sales Department.

FEDERAL TELECOMMUNICATION LABORATORIES, Nutley, N. J. . . . a unit of I T & T's world-wide research and engineering organization.

Federal Telephone and Radio Corporation

100 KINGSLAND ROAD, CLIFTON, NEW JERSEY

In Canada: Federal Electric Manufacturing Company, Ltd., Montreal, P. Q.

Export Distributors: International Standard Electric Corp., 67 Broad St., N. Y.

THESE FEATURES MAKE IT *Reliable*

COMPARE...

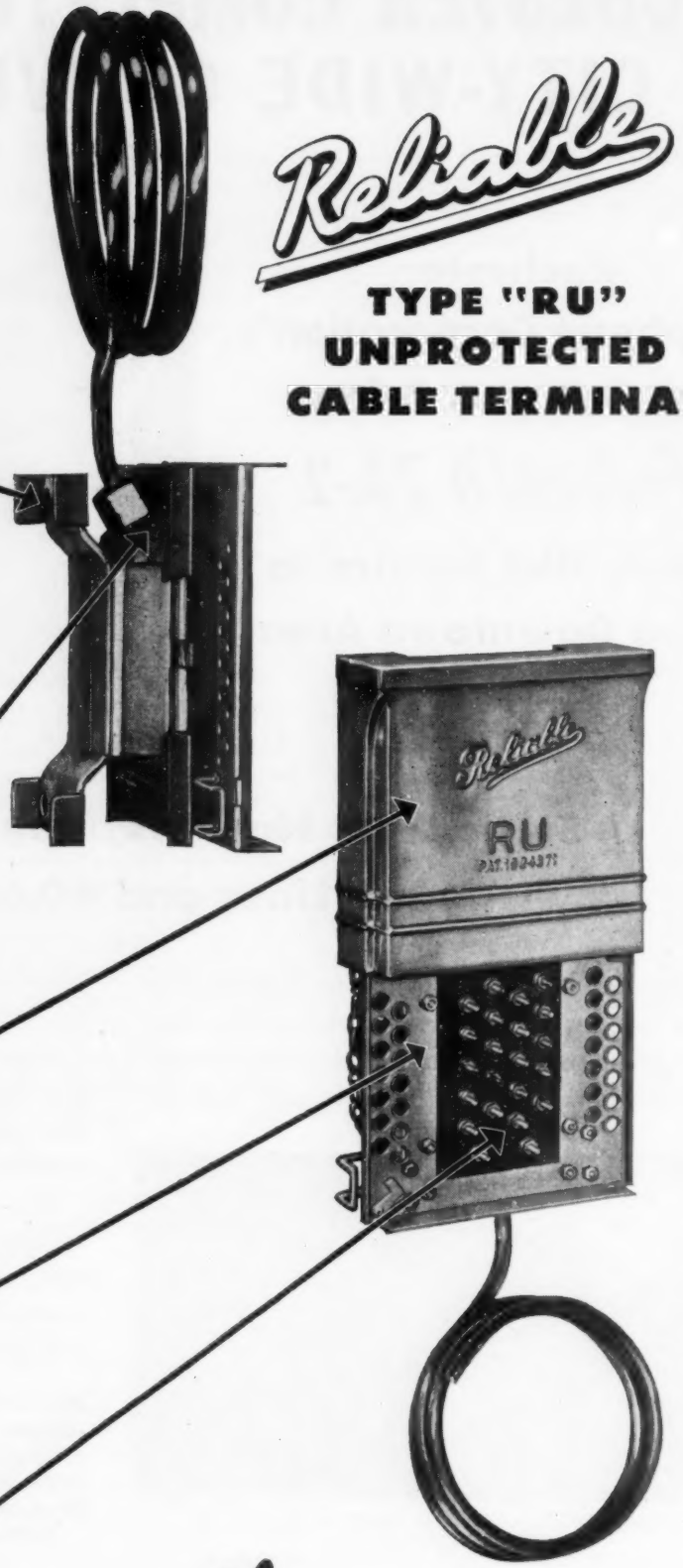
RELIABLE MOUNTING BRACKET
Detachable—for easy lagging into pole. Made of thick aluminum alloy sheet, extremely resistant to corrosion.

RELIABLE CABLE CHAMBER
Extremely durable—drawn from heavy sheet of non-corrosive aluminum alloy. Cable entrance is heavy tinned bushing, packed and soldered for complete protection.

RELIABLE COVER
Sliding cover of non-corrosive aluminum alloy permits installation with stub at top or bottom. Cover is held in raised position by aluminum gravity catch, fastened to terminal body with aluminum chain.

RELIABLE FANNING PLATE
Made of non-corrosive aluminum alloy—provides plenty of room to work on, even with heavy reinforced drop wire.

ALWAYS IN RELIABLE TERMINALS
HEAVY EVERDUR STUDS AND NUTS—
COPPER WASHERS

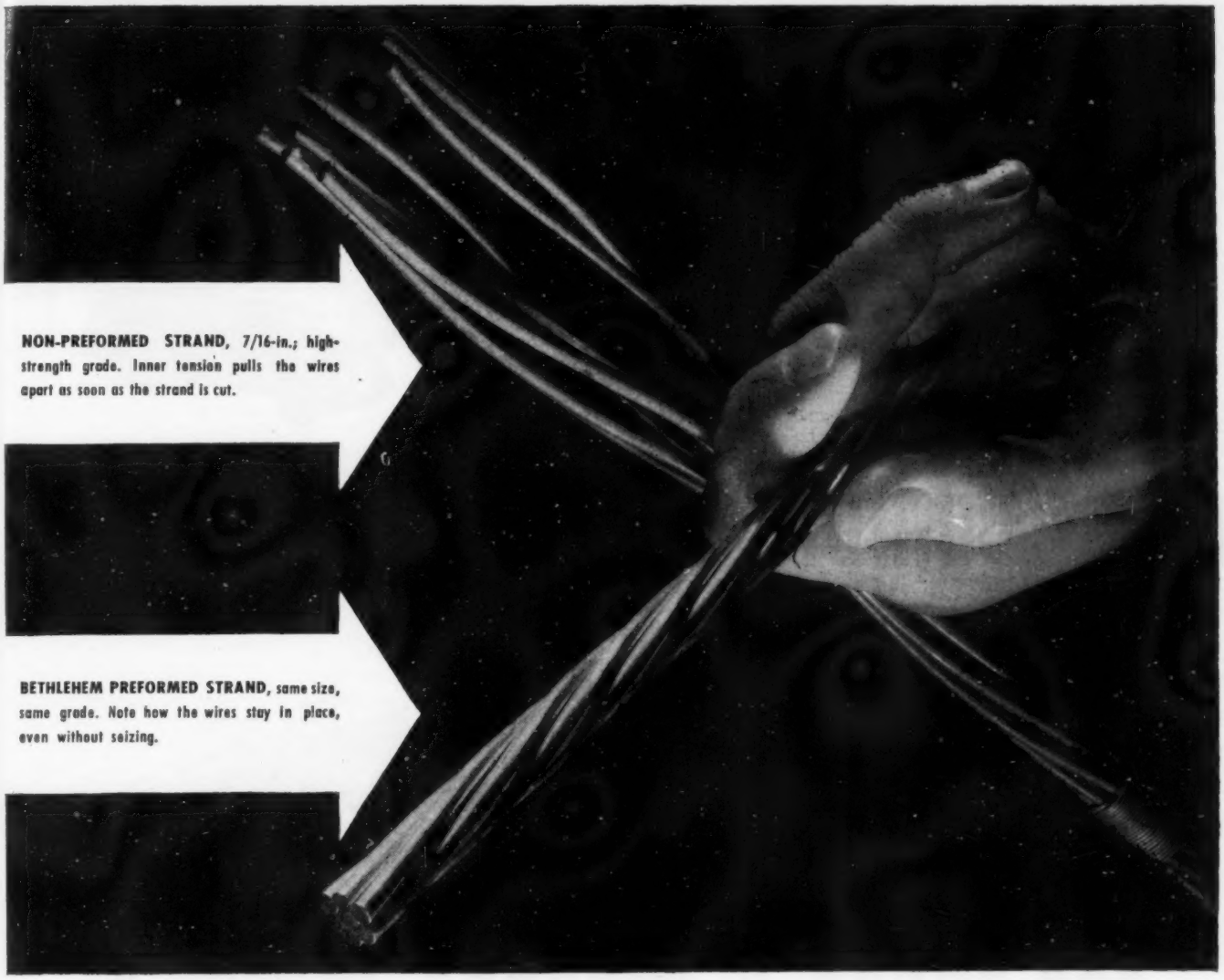


Reliable

TYPE "RU" UNPROTECTED CABLE TERMINAL

Write today for new Bulletin T. Gives full details on this and other Reliable Telephone Equipment.

Reliable ELECTRIC COMPANY
3145 CARROLL AVENUE • CHICAGO 12, ILLINOIS
OVER 40 YEARS' *Service* TO THE TELEPHONE INDUSTRY


NON-PREFORMED STRAND, 7/16-in.; high-strength grade. Inner tension pulls the wires apart as soon as the strand is cut.
BETHLEHEM PREFORMED STRAND, same size, same grade. Note how the wires stay in place, even without seizing.

Bethlehem *PREFORMED* Strand

...so *easy* to handle... so *low* in cost

Ever consider the very real advantages of preformed strand? As made by Bethlehem, it can mean real savings in your handling costs—and you should see how linemen take to it. Here's why:

During the course of manufacture, each wire is preformed individually to its final helical shape. This operation does away with inner tension. Thus, when the wires are laid together as strand, it's almost impossible for them to spring apart—even when seizing is omitted.

Putting it another way, you could say that the wires have been tamed. When the strand is cut, the ends can't fly open. This makes preformed strand much easier to insert in fittings. It also reduces the chances of scratching or gouging the lineman's hands.

How about costs? You'll be surprised at how *little* extra you pay for Bethlehem preformed strand. It's a trifling item—and soon made up, for the lineman's work goes faster, better.

All sizes, types, and grades of Bethlehem strand can be preformed. And, of course, they all have the rust-resisting bethanized coating—made in three weights for corrosive conditions in any given area. Say the word and one of our representatives will be glad to give you the full story.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by
Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

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Choose from America's

most complete line of trucks

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1 **International Trucks are specialized** for the job. International builds America's most complete line of trucks. It offers 22 basic models, 1,000 truck combinations ranging in gross vehicle weights from 4,400 to 90,000 pounds. It also offers 13 truck engines (gasoline, diesel, butane) as well as specialized units and parts, to satisfy individual hauling requirements. An International sales engineer who knows your business in terms of trucks helps you analyze your own hauling needs and select the right International Trucks to meet them.

2 **For the 17th straight year** International Trucks lead in heavy-duty sales. The country's most exacting truck buyers are the men who buy trucks of 16,001 pounds GVW and over. Their vote of confidence in Internationals is based on truck value—the same truck value found in every International . . . light, medium, and heavy-duty.

3 **More than half of all International Trucks** ever built—in 42 years—are still at work. International has been building rugged trucks uncompromised by passenger car design or construction since 1907. International Trucks are built to last—and they do.

4 **International Trucks are backed** by America's largest exclusive truck service organization. 4,700 Dealers and 170 Company-owned Branches offer complete International Truck service wherever you drive a truck. Precision-engineered replacement parts, factory-rebuilt exchange units, and factory-trained mechanics are as close as your telephone. For the right truck to solve your hauling problems, see your nearest International Dealer or Branch.

International Harvester Builds McCormick Farm Equipment and Farmall Tractors . . . Motor Trucks . . . Industrial Power . . . Refrigerators and Freezers

INTERNATIONAL INTERNATIONAL **TRUCKS**

INTERNATIONAL HARVESTER COMPANY · CHICAGO

EDITORIAL

Some Things The Public Should Know

THERE ARE SOME things the public should know, and is entitled to know, about the telephone business. Such knowledge would lead to a better understanding by the public of some aspects of telephone service and of telephone exchange rates.

Of course, the public will not know these things unless the telephone industry tells it about them —and keeps on telling it.

First, the telephone industry is, so far as we know, the only utility industry in which the cost of serving each customer increases as the number of customers increases.

It is generally recognized that the charge for a telephone is higher in a large exchange area than in a small, but most people seem to believe that the telephone company is simply getting the best of the deal by charging more for a telephone when there are more telephones to which the subscriber can talk.

The fact is, as every telephone man knows, that the higher rate is because there must be a much larger investment per telephone in a large exchange area, and that the cost per telephone of supplying the service is much higher in a large exchange area than in a small one.

The telephone business differs in another way from any other utility. It is the only utility that makes all the investment and takes practically all the risk when supplying a subscriber with a telephone in an exchange area.

If the householder installs water service he pays, himself, for the piping on his premises and for his plumbing fixtures and their installation. Likewise if he installs gas service. And he maintains his own piping and fixtures, at his own expense.

If he installs electrical service he pays for and maintains the wiring on his premises, and buys and himself maintains all his electrical appliances.

If he discontinues any of these services he still has his investment in piping or wiring, and still has his fixtures and appliances on his hands.

But when he installs a telephone the telephone company makes all the investment in the exchange rate area and—excepting for a small service connection fee which seldom pays, these days, for even the labor expended on the customer's own premises—the company supplies all the wiring and equipment at its own expense. Then it maintains all these things at its own expense.

When he discontinues his telephone—which he feels free to do whenever he pleases—the telephone company removes it at its own expense. He has no investment left in telephone wiring or equipment.

So, when comparing the actual cost to the householder of telephone service vs. other utility services, it is necessary to keep in mind the fact that the telephone subscriber has nothing to buy and nothing to maintain—and no investment left on his hands when he discontinues telephone service.

The nature of the telephone business requires that it be operated this way. People sometimes ask why the telephone company does not allow the subscriber to buy and own his own telephone, and do his own house wiring. The answer is that the telephone company must be sure that the telephone and other subscribers' equipment are of the kind that operate properly with the remainder of the telephone system, including the central office equipment.

If the householder's own electrical wiring or equipment fails, or if his plumbing or gas appliances or their piping become inoperative, only himself and family are inconvenienced. But if his telephone does not operate properly someone else is also inconvenienced—someone at another telephone.

These things, if generally known, would help to a better understanding by the public of some of the necessities of the telephone business.

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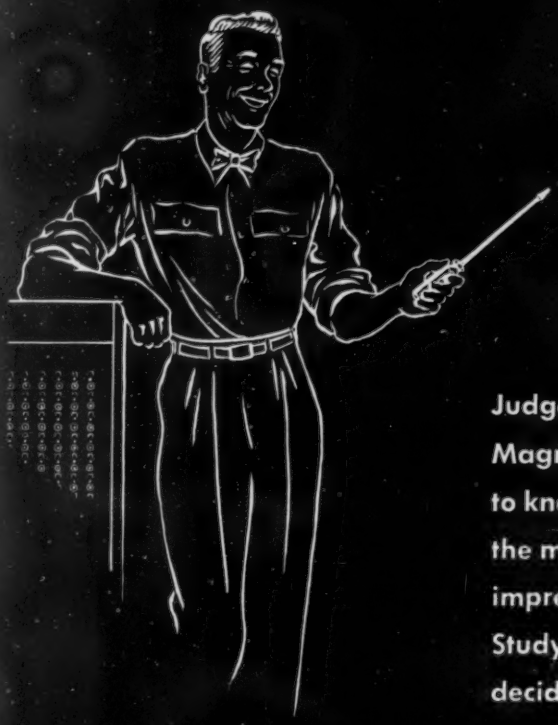
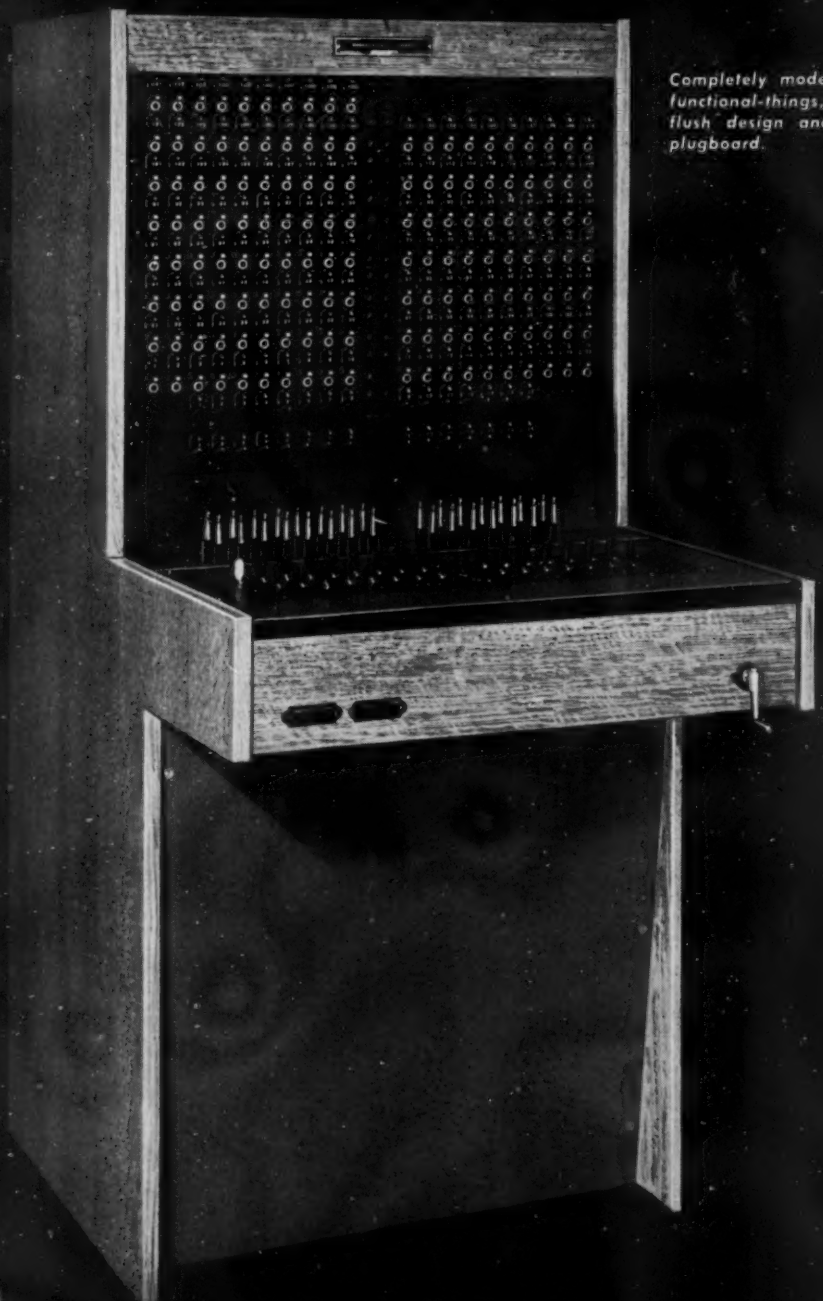


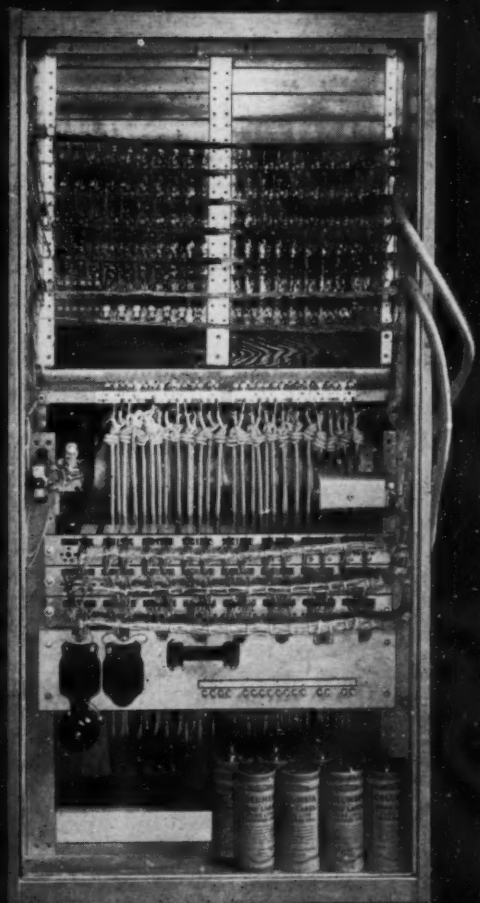
Let's take a No. 2

and see why this Stromberg

Judged by popularity alone, Stromberg-Carlson's number 125 Magneto Switchboard merits the specification of any executive who likes to know what other good companies buy. Beyond this factor are the many operating advantages of this switchboard. They'd be impressively obvious if you saw them, one by one, on our assembly line. Study some of them here — as illustrated by camera and pen — and decide, as thousands have, to "depend on the industry's standard."



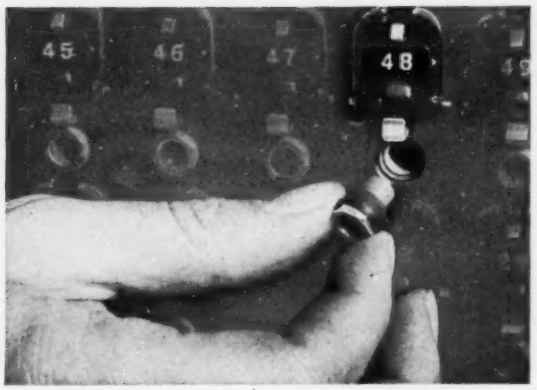
Completely modern, in today's trend to beauty-in-functional-things, is the limed-oak cabinet, with its flush design and formica-veneered keyboard and plugboard.



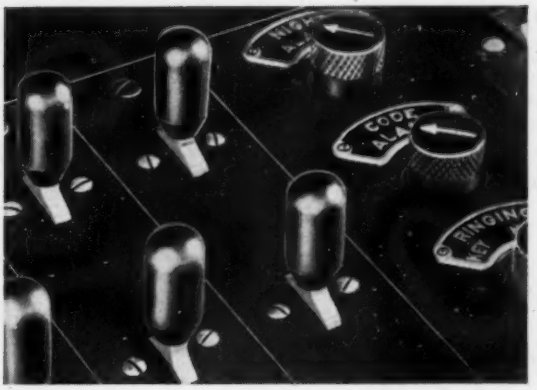
The rear of the switchboard is readily accessible for ease of maintenance. Cable may be brought out either at the top or the bottom of the switchboard.

No. 25 switchboard apart

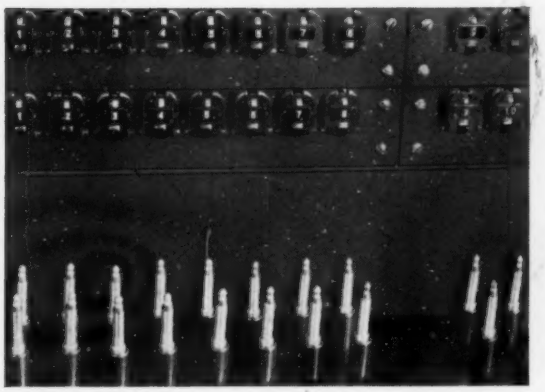
...ber Carlson is the Magneto "Standard"



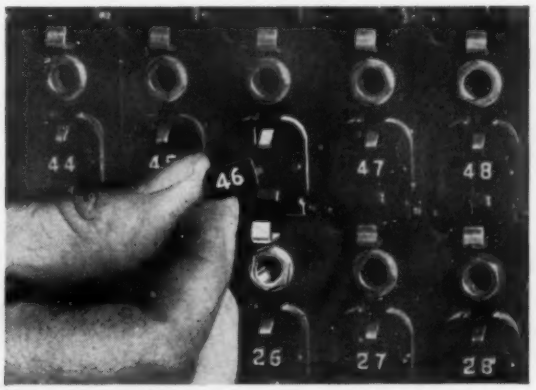
Jack sleeves being the most frequently worn part of any switchboard, Stromberg-Carlson has made its sleeves separately and quickly removable from front for easy replacement.



There is a ring back key on each cord circuit which permits ringing on the answering cord without going through the inconvenience of reversing the cord connection.



Clear-out signals are lined up with the cord circuits on the face of the switchboard, for instant, no-mistake identification.



Number plates are easily removable. Thus lines can be readily made to conform to up-to-date directory listings.

STROMBERG-CARLSON

Factory, General Offices: Rochester 3, N. Y.
Branch Offices: Atlanta 3, Chicago 6, Kansas City 8, San Francisco 3. In Canada: Stromberg-Carlson Co. Ltd., Toronto

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...FASTER!
...ACCURATELY!
...AUTOMATICALLY!
...EASIER!

It's sound business practice in any exchange—small or large—to rely on CALCULAGRAPH to compute and record elapsed toll time accurately to the second. Thus, all the revenue due is charged to every toll call and operators are relieved of detail work that slows switchboard service. Available in several models and adaptable to any installation from flush mounting to portable pedestal types. Every CALCULAGRAPH features low initial cost . . . dependable service year after year. Complete catalog data on request.

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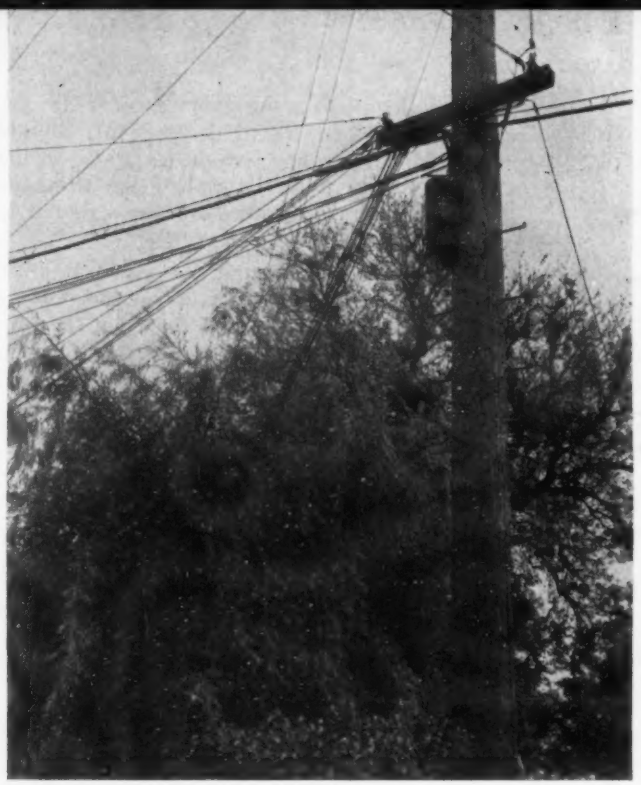


Fig. 1—Tangle of drop wires in Weeping Willow tree. These are the same wires that terminate at the building in the next illustration.

Fig. 2—A ten-wire run to two apartment buildings. Two separate spans of neoprene drop cable, one to each building, would have provided a much neater installation.

Neoprene-Jacketed Cable Relieves Drop Wire Congestion

By John S. Reed

THE NUMBER of subscriber connections in small apartment houses and commercial buildings normally does not justify bringing lead-covered cable into these buildings. The result is that several drop wires must be strung from the cable terminal pole to the protector location inside the building. As indicated in *Figures* 1 *and* 2, such an installation detracts from the appearance of the apartment or business location. Drop trouble is likely to occur, particularly when a group of wires must pass through trees. Furthermore, when a ring run must be placed, the appearance of the building is not enhanced by a bulky mass of stiff drop wires that will not lie straight in the run on the building wall.

There is now available a five-pair neoprene-jacketed drop cable that can be used in place of drop wire runs, where four or more (ultimate) drop wires are required to serve subscribers in apartment houses or small commercial buildings. This cable, a wartime development, consists of five pairs of latex insulated 19-gauge copper conductors encased in a thick covering of neoprene. Special cable grips, similar to drop wire clamps, are employed to support the cable at each end of a free span. On building walls the cable is run in porcelain cleats, or where a masonry surface is involved, in bridle rings. *Figure* 3 illustrates a typically neat and attractive installation of neoprene drop cable from terminal pole to building.

This article describes methods of placing the neoprene drop cable that will assure a neat installation and reasonably long life of the cable.

Since the neoprene-jacketed cable is quite heavy, weighing 139 pounds per 1,000 feet, and since the covering may separate under heavy strain, it is desirable to string free spans of the cable with as little tension as possible. In addition, the span length should be kept as short as practicable, in any case not over 125 feet. (It has been suggested that longer lengths of this cable can be spun on light-weight (2,200 pound messenger.)

Table I gives the *minimum* recommended sags for stringing neoprene drop cable. The sags for the indicated span lengths will result in a maximum unloaded tension of 45 pounds for the pole-to-building spans and 68 pounds for the pole-to-pole spans. It is advisable to place the cable with greater than the indicated minimum sag, where permitted by available ground clearances.

Table I. Minimum Permissible Sags for Neoprene Drop Cable

Span Length in Feet	Pole-to-Building Span	Pole-to Pole Span
50 ft. or less	12″	—
75	30″	—
100	48″	36″
125	72″	48″

Although the neoprene drop cable has a tough coating that, like the standard neoprene-jacketed

drop wire, will stand abrasion to a remarkable degree, it is preferable to route the drop cable span to avoid contact with trees or other objects in all cases where practicable. Drop wire span clamps on the messenger of lead-covered cable can be used to good advantage for this purpose, as shown in *Figure* 4. Two span clamps are used on the messenger, each supporting a span from one direction as indicated.

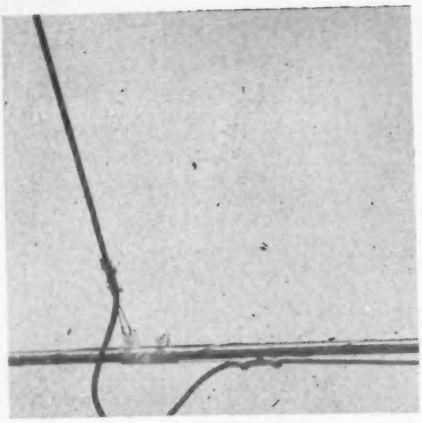


Fig. 4—Use of span clamps to support drop cable being routed around an obstruction.

Use of Special Cable Grip on Drop Cable

SINCE standard drop wire clamps are too small and too light for supporting neoprene drop cable, it is necessary to use a special cable grip of the same type and design as that used to attach power service cable in electrical distribution systems. This device consists of two parallel curved plates coated with emery cement to increase its holding power. The plates are laced together by means of a stiff stranded wire loop, which passes through alternate side hooks in the plates and loops over the attaching fixture, as illustrated in *Figure* 5.

The grip is furnished in a partly assembled form with the stranded wire loops threaded through the hooks on one side of the plates, so that the plates are hinged together. When attaching the grip to the cable, these plates are pulled apart sufficiently to bend the stranded wire in the hooks and enable the plates to be laid parallel to each other on the cable.

The bottom plate is then placed on the underside of the cable with the front hooks facing in the direction of the span. Next, the free button end of the stranded wire is inserted in the unoccupied front hook on the bottom plate. Then, holding the bottom plate firmly in position on the cable, the top plate is brought over the cable, parallel to the bottom plate. The stranded wire is placed in the remaining unoccupied hooks of the two plates and the plates adjusted, if necessary, to make them rest parallel to each other on the cable.

When it is necessary to change the position of the grip on the drop cable, after it is attached to the cable, the stranded wire is loosened from the rear hook of the grip and the plates are slightly separated with the fingers. The grip can then be pushed along the cable to the desired location. Since considerable friction is involved, the grip should be initially located on the cable as near as possible to its final position. Should there be any tension in the cable, the cable must be pulled up with the slack blocks, before the cable grip can be loosened.

When hanging the cable grip on the supporting fixture at the pole or the building, make sure that the protecting wire coil around the stranded wire loop is in position at the point of contact of the loop with the fixture, to reduce wear at this point.

Fig. 3—Two neoprene drop cable spans (indicated by arrows) from terminal pole to apartment buildings.

Fastening Neoprene Drop Cable to Terminal Pole

AS IN STANDARD drop wire installations, it is always desirable to put up the drop cable at the building and then attach the cable to the terminal pole as the final step of the stringing process. When laying the cable on the ground, be sure that no vehicles will run over it, unless boards are laid alongside the cable to keep the wheels of vehicles from crushing the cable. Always have someone stationed to warn pedestrians and drivers of vehicles, when the cable is being raised across a street or an alley (if any traffic is present).

Since a span of cable weighs about four times as much as an equal length of drop wire, it is not practicable for one man to pull up the cable by hand unaided. In this case, slack blocks should be employed. A cable grip is attached to the drop cable sufficiently far along the cable to enable proper operation of the slack blocks and the stranded wire loop of the grip itself is fastened to the slack blocks.

After the cable has been pulled to the proper sag, another cable grip is attached to the drop cable at the proper point to hang on the pole fixture. This grip should be pulled up tightly by hand to set it firmly in place and the stranded wire loop then placed over the attaching fixture.

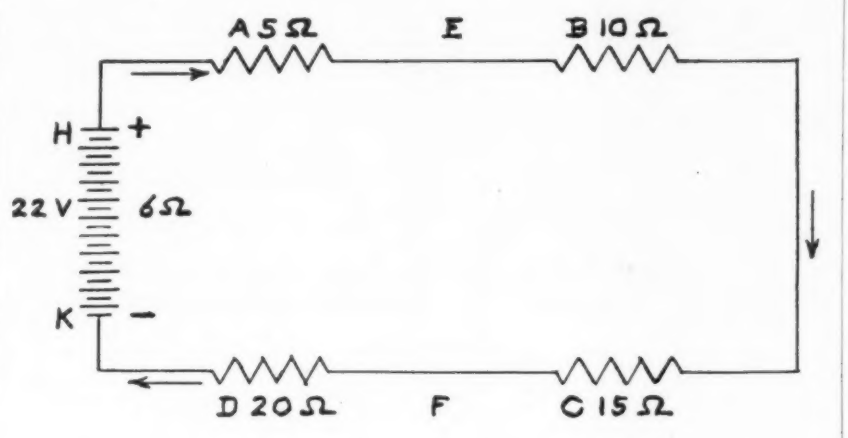
The fixture for supporting the drop cable span is a standard drive hook driven in the pole (*Figure* 5). The cable should not be attached to a guard arm or crossarm, as too much strain would otherwise be placed on the arm.

Connecting The Drop Cable In the Cable Terminal

FIGURES 5 *and* 6 show the method of bringing these drop cables through the bridle rings on the pole and finally into the cable terminal,

(*Please turn to page* 56)

FIGURE ONE



KIRCHOFF'S LAWS

By

JAY G. MITCHELL

IN 1847, G. R. Kirchoff expanded the number of possible applications of Ohm's law by enunciating a thesis of two statements to which has, by common consent and practice, been given the designation, Kirchoff's Laws. The two statements may be expressed as follows:

1. At any point in the electric circuit the algebraic sum of the currents flowing to and from the point is zero.

2. In an electric circuit the algebraic sum of the electromotive forces and voltage drops around the circuit is zero.

It is obvious that these two statements of fact are closely related to the common form of Ohm's law and that they have to do with the current and the voltage of an electric circuit. In application they serve to amplify the possible applications of Ohm's law and provide methods which expedite the solution of many electrical problems and of some which would otherwise be difficult if not impossible of solution.

If in any direct current electrical circuit the electromotive forces and drop in the conductors be represented by "E", the resistance of the conductors by "R" and the current in the circuit by "I" then

$$\frac{E}{R} = I \qquad (1)$$

Now if each side of equation (1) be multiplied by "R" it becomes:

$$\frac{ER}{R} = IR$$

and cancelling out "R"

$$E = IR \qquad (2)$$

Under equation (2) if the electromotive forces and drop or difference of potential in the circuit be expressed in volts, the resistance in ohms and the current in amperes, when any two of these values are known the value of the third expressed in one of the three units may be readily computed.

Equation (2) is, of course, one of the forms in which Ohm's law may be expressed. It affords the methods of applying the second of Kirchoff's laws to the conditions in an electric circuit in which the electromotive force which causes the current flow and the separate individual resistances of the conductors included in the circuit are known and the strength of the current flow in each current path is to be determined. In such an application of Kirchoff's second law the electromotive force of the battery or generator which is the source of the current and causes it to flow is assumed to be a positive quantity and the drop in voltage in each of the several portions of the circuit is assumed to be a negative quantity. In other words the electromotive force causes the current to flow in the circuit while the resistance of the conductors retards the flow of current. Both the electromotive force and the drop in voltage in any circuit are expressed in volts. Should the circuit include an element which presents an electromotive force *opposed* in direction to that of the principal source of current it is obvious that the effect of such an electromotive force would tend to prevent the flow of current and in such cases this opposing electromotive force must be treated as a negative quantity, as well as the several conductor resistances, both tend to retard the principal current flowing in the circuit.

In Fig. 1 a simple loop circuit is shown to illustrate some of these conditions and the elements of such a circuit may be tabulated as follows:

Electromotive Force of the battery H, K,	22 volts (a *positive* quantity)
Internal resistance of the battery H, K,	6 ohms
When a current of strength (I) amperes is flowing through the battery the Drop in Voltage in the battery as a conductor in the circuit is (see expression (2))	6(I) volts (a *negative* quantity)
When a current of strength (I) amperes is flowing through the resistance "A" (5 ohms) the Drop in Voltage in resistance "A" is (see expression 2)	5(I) volts (a *negative* quantity)
In exactly the same way, with a current of strength (I) flowing through all the resisttances "B", "C", and "D", the several Drops in Voltage are respectively,	10(I) volts (a *negative* quantity) 15(I) volts (a *negative* quantity) 20(I) volts (a *negative* quantity)

Positive quantities are added and negative quantities are subtracted. Now in the circuit as shown in Fig. 1 the term (I) is always of the same value and represents the strength of the current in the simple loop circuit which is as yet unknown. Kirchoff's second law, therefore, for the circuit conditions shown is stated as follows:

22 minus 6(I) minus 5(I) minus 10(I) minus 15(I) minus 20(I) equals 0, that is, O = the algebraic sum of the voltages.

It will be noted that 22 only is not minus and so this law is better stated as follows:

22–6(I)–5(I)–10(I)–15(I)–20(I)- = 0 or

22 minus 56 (I) equals 0

therefore 22 equals 56(I) or

$$\frac{22}{56} = I = 0.393 \text{ amperes (3)}$$

The voltage drop in the battery itself, therefore, is 6(I) or 6 times 0.393 which equals 2.358 volts. It might be profitable to point out in this connection that since the electromotive force of the battery is 22 volts and the drop in voltage in the battery under the circuit conditions shown in Fig. 1 is 2.358 volts that the effective voltage of the battery expended in the circuit external to the battery causing the current to flow in the complete closed circuit is 19.642 volts (22—2.358).

NOW suppose that it is desirable to determine the drop in voltage in each of the resistances shown in the circuit of Fig 1. This is done the same way as the drop in voltage in the battery was found. For instance the drop in voltage in resistance "A" is 5 times 0.393, 5(I), or 1.965 volts; in resistance "B" it is 10 times 0.393, 10(I), or 3.930 volts; in resistance "C" it is 15 times 0.393, 15(I), or 5.895 volts and in resistance "D" it is 20 times 0.393, 20(I), or 7.860 volts. The total drop in voltage in the conductors of the circuit, therefore, is 2.358 plus 1.965 plus 3.930 plus 5.895 plus 7.860 or 22.008 volts (22 volts). In other words the truth of the second of Kirchoff's laws is seen, in this simple example, to be proven because the total drop in voltage in the several elements of the circuit, 22.008 volts, which is negative, is equal to the electromotive force of the battery, 22.00 volts, which is positive, so that the algebraic sum of the two is zero. It is true, of course, that the total obtained for the drop in voltage in this circuit 22.008 volts is not exactly 22.00 volts because of the small error in computation caused by the fact that the decimals were carried out to three places only.

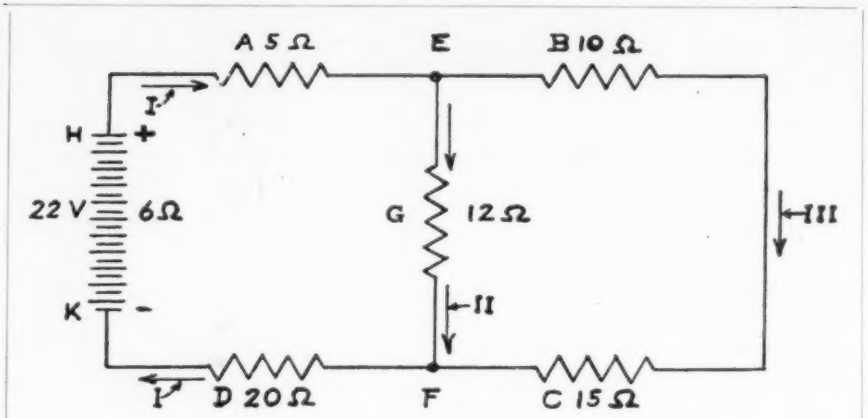


FIGURE TWO

It is also true that the illustration used is a very simple one and that the characteristics of such a simple circuit may be readily determined by other methods. For instance the total resistance in ohms of the conductors in the simple circuit shown in Fig. 1 is 6 plus 5 plus 10 plus 15 plus 20 or 56 ohms. Now according to Ohm's law the strength of the current flowing in a circuit of 56 ohms resistance when the electromotive force of the current source is 22 may be computed by dividing 22 by 56 which gives 0.39286 amperes or practically 0.393 amperes. Another proof of the accuracy of the computation made under an illustrative application of Kirchoff's second law.

Now supposing that it is desired to ascertain the difference of potential between the points "E" and "F" in the simple closed circuit shown in Fig. 1. This is very simple by a similar application of Kirchoff's second law. The difference of potential between "E" and "F" is the drop in voltage in the circuit in resistances "B" and "C". This is 10 times 0.393 plus 15 times 0.393 or 9.825 volts. When the difference of potential between the same points in that part of the circuit which includes the battery 12.183 volts is added to the difference of potential in the other part of the closed circuit, including "B" and "C" the sum is 22.008 volts, the difference of potential or drop in the entire closed circuit. It will be remembered that the second of Kirchoff's laws states that the algebraic sum of the electromotive forces and the drop in voltage in the circuit is zero or, in other words, that the electromotive forces are positive and are equal to the total drop in potential which is negative, the sum of the two being zero.

Since the circuit shown in Fig. 1 is a simple single closed circuit it is obvious that the strength of the current flow in every part of the circuit is the same and this has been found above to be 0.393 amperes. Suppose that the circuit to be considered is that shown in Fig. 2 which is exactly the same as that shown in Fig. 1 except that the points "E" and "F" have been connected by a conductor having a resistance "G" of 12 ohms. It is desired, for illustration, to determine the strength of the current flowing through conductor "G" as well as the strength of the current flowing in the circuit H, A, E, B, C, F, D, K at the same time. In order to solve this sort of a circuit problem it is essential that the direction of current flow in each loop be indicated clearly before the computation is begun. The current flowing in the closed circuit H, A, E, G, F, D, K must be added to the current flowing in the circuit H, A, E, B, C, F, D, K, in order to determine the total current flowing out of the battery H, K. In other words the total current flowing out of the battery is the sum of the current flowing in the closed loop including the battery and the resistance "G" and also that including the battery and the closed loop through resistances "B" and "C". This is clearly shown by the arrows of direction of current flow shown in the figure. It is important, in using the method based upon Kirchoff's laws that the direction of the current flow in each loop in any circuit layout be carefully and clearly indicated because an error in assigning the direction of current flow in any part of the circuit, whether it be simple or complex, will certainly eliminate the possibility of reaching an accurate solution.

Upon examining the circuit shown

(*Please turn to page* 48)

Facts About Cable Splicing and the Cable Splicer

By Geo. E. Williams

President, Geo. E. Williams Co., Minneapolis, Minn.

EDITOR'S NOTE:—*Following publication of J. W. Channell's article, "Modernization of Splicing Practices," in the March, 1949 issue of* TELEPHONE ENGINEER AND MANAGEMENT, *Mr. Williams advised our editors that he disagreed with some of the practices described by Mr. Channell.*

To enable our readers to personally pass upon the merits of practices described by both authors we are publishing the following article by Mr. Williams. We feel sure the article will be read with interest and that our readers will appreciate being provided with the additional information on the interesting subject of cable splicing.

WORKING the metals, known as the *Metal Arts*, is one of the oldest arts known to civilized man.

Different metals have different uses according to their qualities and applications. In this respect lead stands in a class by itself for certain uses. Lead is extremely soft and easy to form and bend into any desired shape. Lead is not affected by the elements of either weather or soil. Lead, therefore, will remain in the same condition permanently.

Joining the ends of lead pipe by the process of pouring specially prepared solder onto the fitted ends and shaping the cooling solder into a uniform body around the lead pipe at the joining ends has been known for centuries as *joint wiping*.

Joint wiping originated and has been perfected in the plumbing industry over a period of hundreds of years.

Lead pipe with wiped joints not unlike the wiped joints used in joining lead pipes and lead sheathed cables of today have been dug up in the streets of Rome that were installed there during the first century.

Therefore, it is natural to say that the lead sleeve is joined to the lead sheathed cable by two plumbers' wiped joints.

For anyone to say that the wiped joint, as a means of joining lead pipes, has been discarded by the plumbers is not true. To prove this, there are more students enrolled in the joint wiping classes of vocational schools today than ever before. The Dunwoody Industrial Institute of Minneapolis has more students actively and regularly engaged in the joint wiping class than at any former time in its history. The Washburn Trade School in Chicago has a large joint wiping class. This is true throughout the nation.

Figure One

A person, like the writer, who has had many years of experience in wiping joints on extra heavy lead pipe that was placed six feet below the surface of the ground and must hold a perpetual water pressure of 100 pounds to the square inch, knows what he is talking about on this subject.

In preparing the ends of the two pieces of lead pipe or cable to be joined, the junction of the two pieces always are at the exact center of the finished wiped joint. Therefore, the body of solder should be heaviest at the center and taper in a uniform curve to a sharp even edge at either side of the joint. An example of a well shaped, uniform, and smoothly finished plumbers' wiped joint which was done with a Formed-Flexible Wiping Cloth as shown in *Figure One*.

As the lead sleeve is slipped over the spliced wires, beat together to fit snugly to the lead sheath of the cable at each end of the sleeve, and a joint wiped on each end of the sleeve; it is natural to say that a cable splice is completed with two plumbers' Wiped Joints.

In an article beginning on page 38 of the March issue of TELEPHONE ENGINEER AND MANAGEMENT by *J. W. Channell*, the author of the article illustrates and describes a cable splice whereby the wiped joints are substituted by what he terms "Cast Joints."

More than 30 years ago there was advertised in the journals of the plumbing industry what was called the, Corcoran Wipe Joint Machine, that produced what they called a cast joint; the same as those described in the above mentioned cable splice. The so-called Wipe Joint Machine

consisted of a split mould which hinged on one side and on the opposite side was a split handle which permitted the split mould to be placed around the pipe at the joining ends and held together by the hand with the split handle. A small hole was provided at the top for pouring the molten solder in. Like the one described in the Channel article, this machine was patented.

Preparing The Lead Sleeve

DURING my 40 years of actual experience in the plumbing industry I have never known one article that was meant or intended to be tinned before use, that was previously tinned at the factory. And that reminds me—when you go to your barber for a shave do you apply the lather at home hoping thereby to save the barber a little time or save yourself a little expense. Like the lather on the face, the sleeve and the preparing of the joints for wiping should be accomplished on the job and the joint wiped immediately or very soon after the joints are prepared.

In the article by J. W. Channell, the author suggests preparing the sleeve and tinning the ends for wiping at the factory. In this article he mentions seven operations the sleeve is put through in preparing it at the factory before it is sent to the field. In the same article he states that when the helper on the job, who is always under the supervision of an expert cable splicer, prepares the sleeve, he accomplishes the same job in two operations.

The surface of lead in any form and under any condition develops a thin film of color commonly called tarnish. This tarnish must be removed from the surface of the parts upon which the joint is to be wiped. Removing the tarnish is accomplished with a shave hook or scraper which shaves a very thin layer of the lead surface and takes the tarnish off with it, leaving the surface extremely bright and clean and ready for the molten solder. Stearine is applied lightly to the shaved parts before the Wiping process begins. The Stearine acts as a flux by fusing the lead and solder together as one solid metal. The stearine should be used sparingly as too much of the stearic acid is not good for the Wiping Solder. The joint should be wiped soon after preparing and before the shaved parts begin to tarnish again.

The idea of preparing the lead sleeve for the wipe joints at the factory, is in my opinion, impractical.

Who Puts Money To Work???

SO FAR as the welfare of the nation is concerned, lazy money is as bad as poverty. It sits up there on the porch and rocks away, doing nothing, earning nothing.

But money that uses its muscles and gets down to work is something else again. It is good for the country, good for the employee, good for the investor.

Who puts money to work?

The man who can take an idea, foresee its future, set up an organization, and use enough initiative and imagination to stay with it till success comes.

That kind of a man is a manager. Good management is the investor's best assurance of a fair return, the employee's best assurance of fair wages and steady work.

Neither the men and women in industry nor the money in industry can be effective without good management. Nothing else is so important to the workers' welfare, the investors' welfare or the public welfare.—*(One of a series of Advertisements by N. W. AYER & SON, Inc.)*

Placing the lead sleeve on a wooden core for the purpose of removing the tarnish simply will not work because the lead sleeve is too soft a metal to form a perfect cylinder by placing on a wooden core. The lathe is certain to cut too deep at places and thereby weaken the sleeve. A perfect cylinder cannot be produced by placing the lead sleeve over a wooden core because the lead is too soft. And a lead sleeve to be touched lightly at every point by placing on a machine lathe is impossible. Especially would the sleeve be weakened by cutting too deep at the edge of the finishd wiped joint and at this point is exerted the greatest strain on the splice.

As each end of the sleeve must be beaten down to fit snugly to the lead sheath of the cable the ends of the sleeve should not be tinned at the factory. Although the lead sleeve is extremely soft it must be beaten to fit the cable slowly and gently with light strokes of some kind of wood tool. Trying to beat the lead sleeve into position too fast will cause the lead to buckle, as the plumber from England says, and there is where lead heating originated and is very commonly used.

After the lead parts are prepared and shaved bright, ready for wiping the joint, those shaved parts should not be touched by fingers or by tool, which is certain to tarnish the bright parts and prevent proper tinning. The lead parts should be firmly and snugly fit into place, and then shaved and the joint wiped soon thereafter.

Preparing the lead sleeve from start to finish is a part of the cable-splicers' craft, and it should be accomplished entirely on the job by or under the supervision of the expert cable splicer.

Fusing the specially prepared solder and the lead at a temperature of more than 400° Fahrenheit overcomes any joining of the two metals and produces what is practically one solid body. Because of this fact together with the fact that the lead sleeve is somewhat heavier than the lead sheath of the cable makes the splice the strongest, and not the weakest, part of a lead sheathed cable.

The Melting Furnace

AFTER reading Mr. Channell's statements on melting furnaces, I made a close examination of a modern furnace made by a prominent company. The structure of the furnace has been completely changed from the type of furnace I knew 35 and 40 years ago.

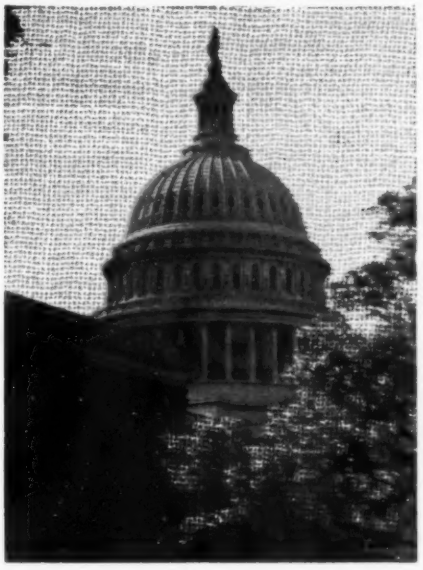
Every furnace manufacturer now makes a furnace especially constructed for the Cable-Splicer to be used in field work. One of the most valuable furnace improvements to the Joint Wiper is the fine flame control which enables the operator to maintain constant control of the temperature of the wiping solder. Keeping the wiping solder at an even temperature is one of the most important points in Wiping the Joint.

Accidents

A FEW years ago there was pictured in the Telephone Journals a group of cable-splicers operating in Minneapolis and the State of Minnesota who had just finished their second three-year period without a lost-time accident. Cable construction is kept within the realm of safety mainly through knowledge, experience, and care. I have never heard of an accident experienced by either the apprentice plumber or the apprentice cable-splicer while learning Joint Wiping.

The cable-splicer is today doing

(Please turn to page 62)



Washington Bureau Reports

By

Roland Davies and Fred Henck

Rural Telephone Legislation

IT WAS An "even money" bet among observers of the Senate Agriculture Committee hearings on the Hill Bill for financing of rural telephone construction that approval of such a statute would not be forthcoming until some of the amendments proposed by representatives of the Independent telephone industry had been incorporated in the measure. And odds takers among some of the more seasoned watchers of Washington legislation were willing to take the long end of wagers that proponents of the Hill and Poage bills on farm telephones would not be able to push through the Senate measure before adjournment of Congress this session.

It was strongly apparent throughout the hearings on the Hill proposal that representatives of the Independent segment of the telephone industry had raised strong doubts in the minds of Senate Agriculture Committee members on the validity of lending government money for rural telephone construction and, particularly, had sharply pointed up the question: "*How many rural residents actually want telephone service in their homes?*"

Supporters of the proposed legislation, led by Clyde Ellis, Executive Manager of the National Rural Electric Cooperatives Association, and 19 small Independent telephone company managers and REA cooperatives' officials, plus spokesmen for the American Farm Bureau, the National Grange and the National Farmers Union, were followed on the witness stand before the Senate Agriculture Committee by a group of Independent representatives who protested against the Poage bill—passed by the House—and the Senate counterpart as written by Senator Lister Hill (D., Ala.) and nine other Senators.

The rural telephone measures which would grant the Rural Electrification Administration the right to grant loans were termed "an invitation either to bankruptcy or to subsidy" by Carl D. Brorein, President of the Peninsular Telephone Co., while R. A. Lumpkin, President of the Illinois Consolidated Co., Mattoon, Ill., charged that REA Administrator Wickard had indicated his favor of loans to cooperatives over private telephone companies.

Endorsed by the half dozen other Independent telephone representatives who protested the Hill proposal at the Senate hearings, amendments proposed by Mr. Lumpkin were that the measure (1) clearly prohibit use of any funds loaned in duplication of service or facilities of existing telephone systems; (2) remove the bill from the "realm of public ownership legislation;" (3) require that interest rate on all loans be not less than the overall cost to the government of its own long term borrowings; (4) require all applicants for loans to show that they have exhausted customary sources of commercial loans before seeking funds from government sources; (5) prevent the dumping of financially distressed properties onto the government through the simple expedient of refinancing existing indebtedness with government money; and (6) safeguard and confine benefits under the bill to small rural systems either by limiting the size of applicants eligible for loans or by putting a definite ceiling on loans which may be made to any individual company or system.

Recommendations for amendments to the proposed legislation were also made by Mr. Brorein. He proposed that the words, "public bodies" be stricken from the list of those eligible to receive loans, pointing out that such a provision in the measure would permit cities, counties, states or other government units "an entering wedge to public ownership of the telephone industry" which would eventually "require the Federal ownership of the entire industry to provide the type of universal service now provided by private industry."

Mr. Brorein also recommended that the Reconstruction Finance Corporation, rather than the REA, should handle rural telephone service loans, because of the RFC's background of practical banking experience and he asked that loans be barred which would result in duplicate service in an area being served unless the existing companies were unable or unwilling to extend service.

The first witness for the Independents in opposition to the rural telephone measure, Frank S. Barnes, President of the USITA who heads the Rock Hill Telephone Co. of Rock Hill, S. C., had emphasized to the Senate Committee that the telephone companies of the nation had made great strides since the end of the war in extending service to farm areas and that telephone service is now available without construction charges to the subscriber in about 85% of the occupied rural area of the U. S.

In answer to proponents of the proposed legislation that only 37 to 42 percent of the farms of the country

have telephones today whereas more than two-thirds of the farms have electric service, Mr. Barnes pointed out that "in this month of August, 1949, rural telephone development very closely approaches 50 percent of the occupied farms of the United States (and) furthermore, there has been an increase of 34 percent in the number of rural telephones added since 1945, and after WPB restrictions were released."

Mr. Barnes touched on a soft spot in the arguments for REA-administered rural telephone loans when he advised the Senate Committee that the cause of inadequate telephone service as may have existed in some places during the past 12 years or so has been inductive electric interference from REA lines which practically wrecked small rural telephone systems that previously rendered a satisfactory grade of service to farmers and others.

Stressing the necessity for continuance of the private enterprise system in the telephone field, Mr. Barnes brought out in his testimony that Senator McFarland of Arizona, ranking majority member of the Senate Interstate and Foreign Commerce Committee, had recently stated that: "*While few realize it, the future of our kind of life is involved in the kind of communcations policies we have. All over the world, the avenues of communications are in the hands of the state. Only in the United States do we have a free, privately owned system. We want to keep it that way. In broadcasing, we have freedom of expression and opinion under a public interest licensing system; in the common carrier operation of telegraph, telephone and cable, whether by wire or by radio, we have privately owned operating companies. In neither case do we want the Government's finger in the pie.*"

As a display of the desire for encouragement of private initiative, Mr. Lumpkin invited the REA, sponsors of the Hill Bill, and the National Association of REA Cooperatives to get together with Independent telephone companies in amendments which would prevent unfair competition, bar REA loans for wasteful duplication of service facilities and prevent possible use of the legislation to introduce public ownership into the telephone industry.

Surveys of potentialities of the rural telephone field served as a high point in testimony of the Independent industry witnesses before the Senate Committee. Mr. Lumpkin presented a picture of his company's area which showed that among farmers near Mattoon, Ill., some farmers "simply do not want telephone service." His company's survey, Mr. Lumpkin brought out, showed that 74.4 percent of the rural residents in that area already had service and 3.5 percent of the farm dwellings were unoccupied, leaving only 22.1 percent as prospects for new service. Only 2.7 percent, however, agreed to subscribe while 14.7 percent "flatly stated that they did not want service."

Lamar S. Stoops, Manager and Secretary-Treasurer of the Nappanee Telephone Co., Nappanee, Ind., told the Committee that a survey by his company of a newly-acquired rural area indicates the "disappointing results" that only 24 of the 61 occupied dwellings in the territory desire service. "In other words," he explained, "64.7% of the families do not want service, and mind you, permitting a Chamber of Commerce phrase, this is the 'garden spot of America'."

Mr. Stoops suggested that sufficient investigation of the problems of telephone companies had not been undertaken by members of Congress considering the rural telephone legislation and he cited that "If Uncle Sam is really sincere in its concern for the welfare of the nation's telephone users, then may I suggest you gentlemen in Washington give serious consideration to the repeal of this inequitably excise tax on communications service."

W. G. Winters, President of the Hull Telephone Co., Hull, Tex., who appeared before the Senate Committee on behalf of the Texas Telephone Association as well as his own company, flatly declared "to much weight" has been given to statistics on rural telephone installations. Remarks of proponents of the legislation, he said, "clearly indicate the bill is largely based on false premise, and the people should not be misled into debating or defending statistics showing the number of telephones on farms as indicated in their station statistics reports under the head of rural telephones—their increase or decrease since 1920."

The manager of the Hutchinson Telephone Co., of Hutchinson, Minn., Warren B. Clay, also pointed up the question of the number of rural residents who actually want telephone service. A survey by his company, he said, showed that 21.1 of the farm families "in our area do not feel that telephone service is a necessity, and most of the nonsubscribers consider the telephone a luxury."

Clyde McFarlin, President of the Montezuma (Ia.) Mutual Telephone Co. and head of the Iowa Independent Telephone Associoation, veteran witness before Congressional committees on matters affecting the telephone industry, presented two main propositions to the Senate Committee on the rural telephone bills: "(1) That there is no necessity for this legislation because the job is already being done—done by private industry with private capital without government subsidy; and (2) that the bill in its present form provides for loans to create competing telephone systems to existing companies."

Important testimony on the rural telephone bills was to be presented later at the Senate Committee hearings, at a date beyond the press "deadline" of Telephone Engineer, by Harold V. Bozell, President of the General Telephone Corp—THE END.

Coming Conventions

Rocky Mountain Telephone Association, Newhouse Hotel, Salt Lake City, Utah, Sept. 22-23.

Michigan Independent Telephone Association, Olds Hotel, Lansing, Sept. 22-23.

United States Independent Telephone Association, Stevens Hotel, Chicago, October 10, 11, 12.

Virginia Independent Telephone Association, Chamberlin Hotel, Old Point Comfort, Va., October 20-21.

North Carolina Independent Telephone Association, Carolina Hotel, Pinehurst. N. C., October 27-28.

South Carolina Independent Telephone Association, Wade Hampton Hotel, Columbia, Nov. 1-2.

Florida Telephone Association, Sheraton Plaza Hotel, Daytona Beach, Nov. 8-9.

Oklahoma Telephone Association, Huckins Hotel, Oklahoma City, Nov. 8-9.

South Dakota Telephone Association, Cataract Hotel, Sioux Falls, Nov. 9-10.

Georgia Independent Telephone Association, Henry Grady, Hotel, Atlanta, Ga., November 14-15.

Missouri Telephone Association, Governor Hotel, Jefferson City, Mo., November 14-15.

Alabama Independent Telephone Association, Jefferson Davis Hotel, Montgomery, Ala., November 17-18.

RECENT Developments In STROWGER

Automatic Toll Ticketing

By L. L. Ruggles

Chief Sales Engineer
Automatic Electric Sales Corporation

EDITOR'S NOTE:—*Part One of Mr. Ruggles' article appeared in the July, 1949 issue of* TELEPHONE ENGINEER AND MANAGEMENT.

NOW LET us examine the steps which must be taken to sort out the various kinds of calls which the Sunland subscribers will be making. Figure 3 shows in schematic form the classes of calls to be made by local subscribers and the method of handling each type of call. You will note that three classes of subscribers are shown—(A) Local Rate, (B) Extended Rate, and (C) Paystations. Five general classifications of calls are illustrated:

(1) Local calls which are dialed by local subscribers through the central office equipment directly to other local subscribers.

(2) Long distance calls which must be routed to an operator at the L. D. toll board.

(3) AB or short-haul toll calls which must be routed through Automatic toll ticketing equipment and thence to any one of the exchanges in the metropolitan area to be served on the AB toll plan. These exchanges, as you will note, are located in six different AB toll zones. As pointed out previously, the local rate subscriber is charged a standard toll rate for such AB calls, while the Extended Rate subscriber is charged at unit rates.

(4) Extended calls, which can be made only by Extended Rate subscribers to specified exchanges in adjacent exchange areas.

(5) Paystation calls which require the assistance of an operator for all toll, AB or LD.

To accomplish this sorting and routing of calls, requires equipment which will recognize the destination of the call from code dialed by the originating subscriber. It is further necessary that the equipment recognize instantly the class within which the calling subscriber falls, that is, Local Rate, Extended Rate, or Paystation. The equipment which is now operating in Sunland to accomplish this purpose is known as the Director. This Director is capable of (a) recognizing the rate class in which the subscriber falls; (b) determining the route which the call should take to its destination as shown in the diagram; and (c) completing the connection by controlling the switching equipment. It will not be necessary to describe the process by which the local calls or long distance calls are completed since we are confining this discussion to Automatic Toll Ticketing as it applies to the AB toll calls in the area.

As a preliminary to the demonstration of the handling of such calls, Figure 4 indicates schematically the process by which AB toll calls are completed. You will note that no attempt has been made to show all of the local switching equipment; however, we have shown a primary selector, equivalent to a first selector, to which the subscriber's line is connected when a call is initiated. Associated with the primary selector is a device known as a Director Hunter which immediately searches over a common group of Directors for one which is not occupied. Upon seizure, the Director will return dial tone to the line. On the average, the subscriber will receive dial tone within one second. The subscriber proceeds to dial the desired number which is registered in the Director.

From the first three digits dialed by the subscriber the Director determines the proper routing of the call. For this purpose, the Director closes a circuit path to a translator, which interprets the code dialed by the subscriber. The translator instantly registers in the Director the translated code known as a directive. This operation requires 200 milliseconds or less.

The routing of the call and other important control and record functions depend upon this directive. The Director uses the directive to complete the call, and to transmit essential data to the ticketing equipment.

A call to a central office in Los Angeles reached through a step-by-step tandem office will be routed by the Director in the following manner:

The first digit of the translated office code (or Directive) will cause the primary selector to occupy a circuit to a ticketer with which is associated an AB trunk selector. The next digit transmitted by the Director will operate the AB trunk selector to a level corresponding to a trunk group to the tandem office and seize an idle trunk to a selector in that office. The Director will then control the sending of sufficient digits to select a path to the terminating office and finally will repeat the last four digits as dialed by the caller to select the called station.

If and when the Sunland equipment shall be required to route calls through a cross bar tandem office the Sunland Director will route the call to the tandem and then transmit the

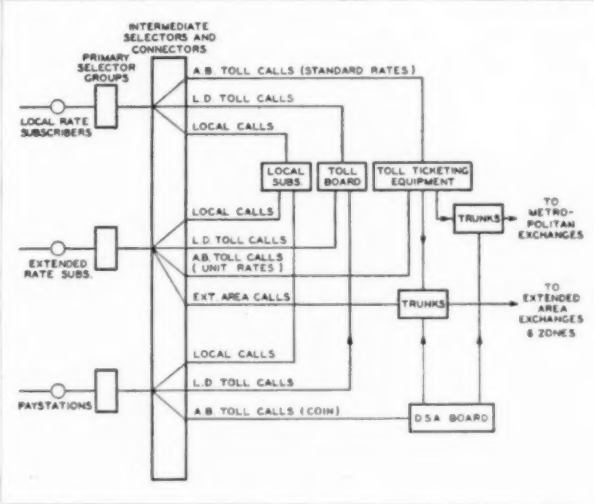


Fig. 3—Schematic Showing Call Classification and Distribution.

complete seven digit directory number into the cross bar registers which will then take over to complete the routing of the call.

The Director function in this case may be contrasted with the requirement for routing calls direct to step-by-step offices. In the latter case the Director routes the call by sending only two office-selecting digits and then the four digits representing the subscriber's number.

Simultaneously with the transmission of the switching control impulses, the Director also transmits to the Ticketer the following coded information regarding the call which is in progress: (1) Calling station number; (2) Calling station class of service (i.e. local rate or extended rate); (3) Called station number; (4) Called station zone, and (5) Identification number of the Director involved in the call.

While our call is being routed to its destination, it will be interesting to see how the Director has collected and recorded all of this essential information.

(1) The calling subscriber's number is obtained by the Director from two sources: From the subscriber's dial which identifies any of four parties on a line, and from the detector which it momentarily calls into action. The detector searches over all the connector terminals in the exchange within a period of two seconds or less and records, in the Director, a code number representing the calling subscriber's connector terminal number which corresponds to his directory number.

(2) The class of service information is obtained from the segregated group of primary selectors through which the call was originated.

(3) The called station number was registered in the Director from the digits dialed by the calling subscriber.

(4) The called station zone was also indicated by the exchange name or code dialed by the calling subscriber. The rate which applies is obtained from the translator.

(5) The Director identity number is a circuit function of each Director in which individual jumpering controls the identification code transmitted to the ticketer until the call is completed.

The call which we initiated has by this time reached its destination and the Director has detached itself from this series of operations. The average time of occupancy of the Director on ticketed calls is 17 seconds. Local calls occupy the director for about six to seven seconds. If the called station is busy, the proper signal is returned to the calling subscriber who upon restoring the handset to its cradle will release the complete train of switches including the Ticketer with all its stored information. Likewise, an unanswered call will result in the same restoration of equipment when the calling party abandons the call.

At this point no recording equipment has been occupied and therefore, no partial records have been made. Only completed calls are recorded.

If the call is answered, the Ticketer will close control circuits to the Dater-Timer unit and start the timing of the call. Conversation time in minutes is registered and stored in the Ticketer. The release of the connection at termination of the conversation is under control of the calling subscriber. This action stops the timing and causes the Ticketer to lock itself in its operated position while allowing the balance of the switch train to release, thereby, releasing all trunk paths for other calls. This self locking operation also starts the recording of the call on a perforated tape under control of a Tabulator which is automatically associated with the Ticketer at termination of the call. The Tabulator controls two separate perforators: (1) The Ticket Perforator for billing purposes, and (2) the Record Perforator for a permanent record of all calls and for traffic and maintenance purposes.

The Ticket Perforator punches a tape which records in code the following information:

(1) Date.
(2) Clock time.
(3) Calling station number.
(4) Calling station class of service.
(5) Called station number.
(6) Rate which applies to the call.
(7) Conversation time in minutes.

The Record Perforator records all of the above information and in addition the identity number of the Director used to set up the call and the identity numbers of the Ticketer and the Tabulator.

The ticket tape may be used to control a printer which will print a ticket containing all of the essential information. Alternatively, the tape may be fed through a machine which will punch a tabulating card for each call. The cards may then be sorted by machine and used to automatically print the subscribers' bills.

The record tape is used for maintenance purposes for assistance in analyzing the over-all operation of the equipment. This tape is also a complete duplicate record of all AB toll calls completed. A typical record tape is illustrated in Figure 5.

The Strowger Automatic Toll

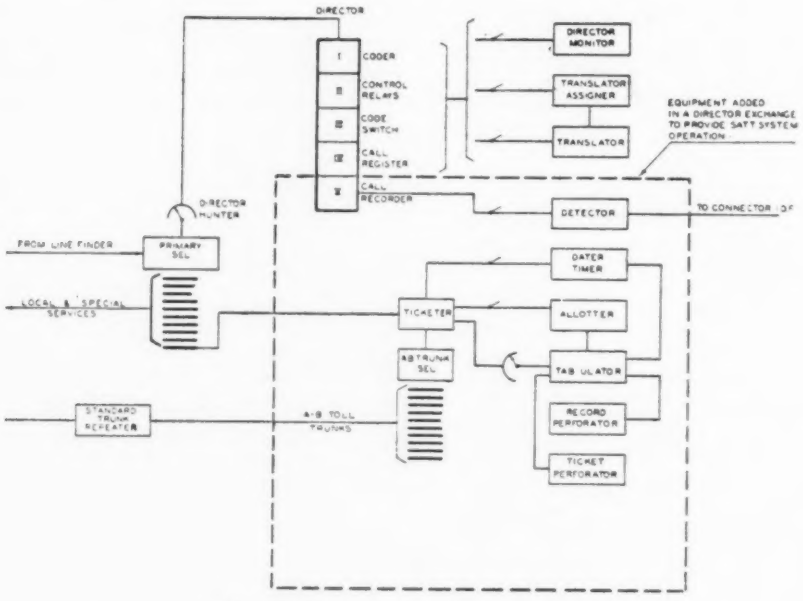


Fig. 4—Switching Schematic for Director and Toll Ticketing Equipment.

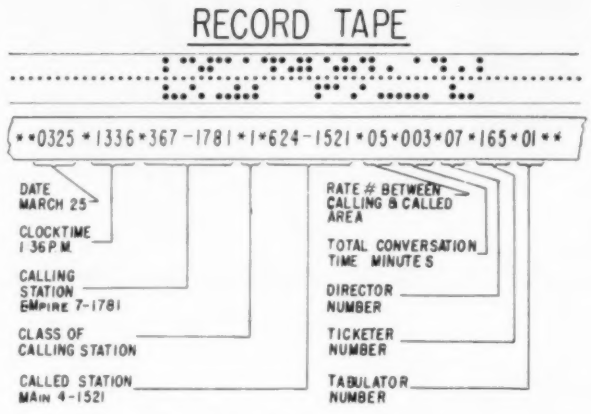


Fig. 5—Typical Record Tape.

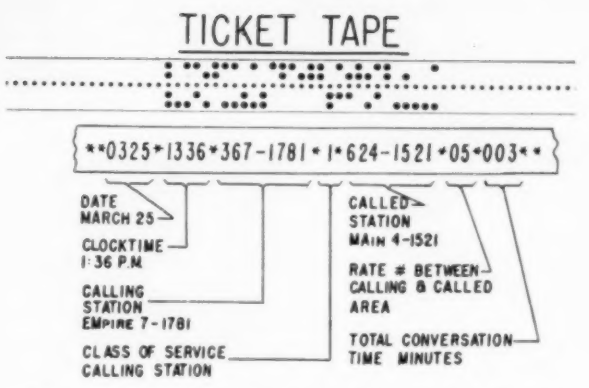


Fig. 6—Typical Ticket Tape Without Total Computed Charges.

Ticketing System (SATT System) has the inherent flexibility which permits the operating telephone company to choose the system of billing which it considers best suited for its own particular needs. Preceding paragraphs have touched upon these variations but it may be interesting to examine them in more detail.

Company "A" prefers to use printed toll tickets containing only the information which an operator would normally write on the ticket with the addition of the code for the rate which applies. These tickets will be sorted manually. The total charge will be calculated from the information on the ticket which, of course, would include the code for the rate which applies. The total charge will be entered on the ticket and billing will be done in the usual manner, the essential information being copied on the subscriber's bill. To meet this condition, the Tabulator which controls the Ticket Perforator, would contain only the essential apparatus for producing a tape recording of the basic information required, exclusive of the computation of the toll charge. Figure 6 illustrates this type. The punched tape, when run through a printer, will produce the printed information shown.

Company "B" desires a little further refinement by having a complete ticket printed which would include the computed toll charge. This plan requires a Tabulator to which is added computing equipment to enable the Tabulator to control the Ticket Perforator so that the resulting tape will record the total computed charges. The tape, when processed through the printer will produce a complete toll ticket similar to those already shown, but with the addition of figures representing the total computed charges. This eliminates the necessity for manually calculating the toll charge.

Company "C" finds it economical and desirable to carry the process of mechanical billing to its ultimate. Here the ticket tape is passed through a card punch machine which will punch a card for each call. The card in this case will record all the necessary information for processing through automatic tabulating and computing equipment which prints a complete bill ready for mailing.

An intermediate step in this process requires a card sorter which will collect all cards for calls made by an individual subscriber. The sorter is, of course, valuable for collecting any detail which may be necessary for analyzing this class of toll business. Some examples include: (1) Total billings in dollars and cents. (2) Total number of calls made in a given period, (3) Holding time data, (4) Total calls by classes, etc.

L. L. RUGGLES

Some companies plan to punch cards manually for all tickets received from connecting companies so that all billing will be done mechanically.

The automatic toll ticketing equipment we have been discussing has the inherent flexibility which is necessary for a wide range of application. The pioneer installations *have been* and *will be* examples of meeting the needs of heavy traffic conditions. Such cases require most of the features described. It is well within the realm of possibility that less elaborate combinations of elements of the system may be applied to smaller scale operations as needs develop.

It is also of interest to note the possibility of using a combination of the Director and the automatic toll ticketing apparatus just described for completing long distance calls to automatic subscribers *under operator control.* With such a system, the function of the operator would be limited to dialing or keying the proper toll codes and called numbers in addition to supervising the call. The operator would not be required to write a toll ticket. The information which would be automatically recorded as described in previous paragraphs, would be collected partly from the Director and partly from the toll ticketer. The operator work units which might be saved under such a plan would be appreciable and therefore the efficiency of the operator increased proportionately.—(*Paper presented at the 30th Annual convention of the California Independent Telephone Association, June* 23, 1949.)

EASIER, FASTER DIAL CONVERSION

MORE DEPENDABLE SERVICE

All these advantages are yours w

SIMPLIFIED MAINTENANCE

EASY, INEXPENSIVE EXPANSION

SIMPLIFIED OPERATION — All the lines in the multiple of the Leich Dial System are connected to the finder and connector switches by stainless steel bars. This unique arrangement eliminates many thousands of soldered connections, makes it impossible to have opens or transposed wires in the multiple.

DEPENDABLE ALL-RELAY PERFORMANCE — The Leich Dial System brings you the dependable day-in-day-out performance for which relay systems are famous. There are no mechanical motions greater than that of a relay armature. There are no intricate mechanical ratchets, pawls or clutches to require adjustment. The full size relays have *preformed* make and break springs which assure correct contact pressure.

EASY TO ADD LINES, LINKS — Unlike ordinary relay systems, it is a simple matter to have your own switchboard man add lines and links to the Leich Dial System. Line circuit relays are arranged in groups of ten, on relay bars which are simply jacked-in. No soldering necessary. Even the finder and connector switches can be jacked into position and connected to all lines in the multiple without any soldering. Time, about two hours. This jack-in construction saves time, labor and money in regrouping to meet changing traffic conditions and installing additional equipment.

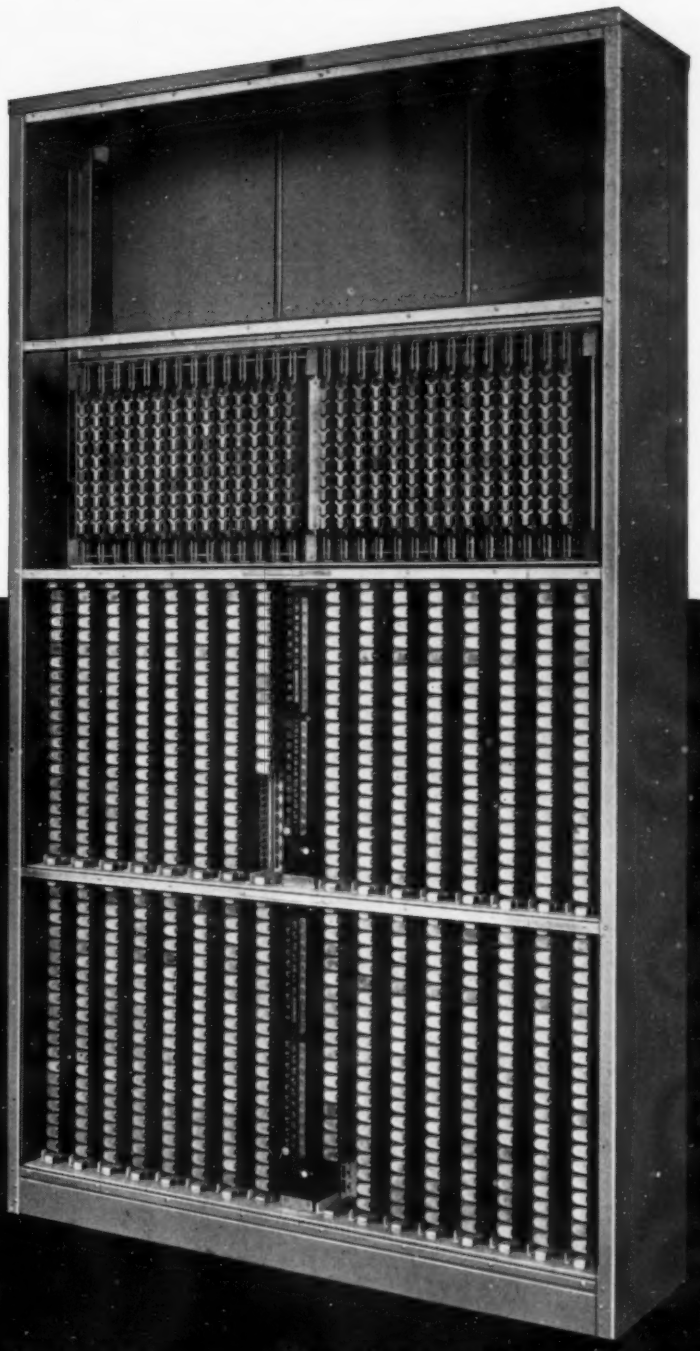
EVERY SERVICE AND OPERATING FEATURE — Every desirable service feature has been incorporated into the standard Leich Dial Switchboard. With the Leich System you can have a separate switch for each toll line, and thus be ready for nation-wide toll dialing or a network of dial offices.

PLENTY OF LINKS — The design of the Leich Dial System makes it unnecessary to skimp on links, which is the case with some dial systems. A standard 100 line Leich Switchboard has provisions for 14 links, more than adequate for practically all traffic conditions.

EASIER TO INSTALL AND MAINTAIN — One man, with a helper, can install a 100 line Leich Dial System in about 10 or 12 days. All the parts are in small packages, ready to be jacked-in to the framework. Everything is within easy reach, there is no crowding of equipment, no back to back arrangements. If a relay bar or a switch should develop trouble, a new one can be easily and quickly jacked-in while the one in trouble is being repaired.

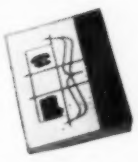
LEICH MANUFACTURERS OF TELEPHONES, SWITCHBOARDS AND RELATED APPARATUS SINCE 190

...ours with the Leich dial system



The Leich Dial System was designed to be a more simplified type of dial switchboard. It was planned to make it easier and less expensive for you to convert to dial. Also, it was designed with the idea of furnishing insurance against future expansion by making it possible to add lines and links by simply jacking them in to the switchboard.

If you plan on converting to dial operation, it will be well worth your while to have one of our engineers give you the complete story. Leich Sales Corporation, 427 W. Randolph, Chicago 6, Illinois.



SEND FOR CATALOG AND COMPLETE INFORMATION

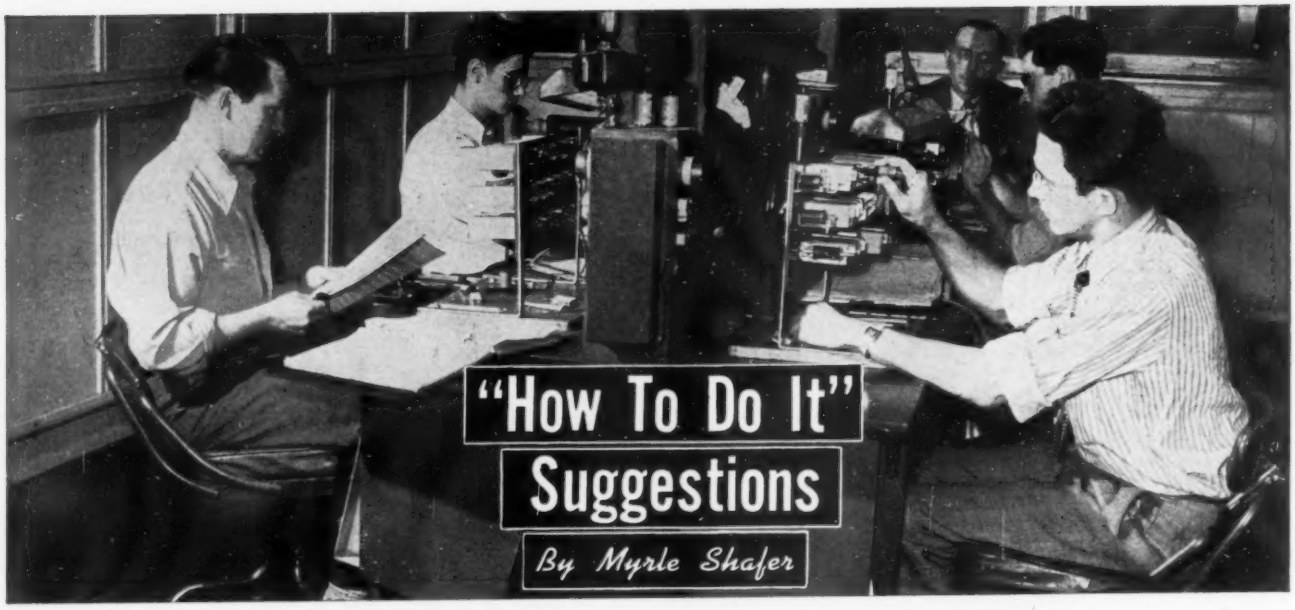
Leich Sales Corporation - 427 W. Randolph - Chicago 6, Illinois

Please send complete information on the Leich Dial System

Company .....

City & State .....

By .....



"How To Do It" Suggestions

By Myrle Shafer

Reporting Primary Wires ... Falling on Telephone Cable

IN JOINT POWER and telephone construction, a power primary wire at the top of the joint poles may break in a storm and fall on the telephone cable below, burning the cable and supporting strand. In many cases when this occurs, the cable sheath may be pitted and the strand partly burned through, without damaging the pairs inside the cable. The result is that the telephone company is not aware of the damage, until the strand fails or the cable sheath admits moisture and trouble develops.

Many telephone companies have adopted the practice of enlisting the local power company's cooperation in reporting to the wire chief all cases of primary wire breaks involving their cable. Whenever the telephone company receives a report of a wire break of this kind, cable men are dispatched to repair damages in the cable, as soon as the power company has fixed the broken wire. This procedure greatly reduces the number of interruptions of telephone service from cable contacting fallen power wires.

Pouring Concrete Around Pole Set in Driveway

TELEPHONE companies have experienced trouble, when cement laying contractors pour cement around their poles set in alley or sidewalk areas. The difficulty is that, when the pole is replaced or removed, the concrete around the pole must be broken up, resulting in extensive damage to the sidewalk or driveway.

Whenever a sidewalk or large driveway is to be laid in areas where poles

Fig. 1—Space purposely left around pole, when pouring cement in sidewalk or driveway areas.

are set, it is a good idea to instruct the contractor to leave an open space around each pole, as shown in *Figure* 1. This space can later be filled in with a thinner layer of cement, or where appearance is not a factor, a cinder or gravel fill can be used, though such a fill is apt to become weedy, unless treated to prevent weed growths.

Safeguarding Service Along Coaxial Route

WITH THE twist of a dial, a maintenance man in Dallas can start the engine for emergency power at an unattended repeater station a hundred miles away.

This kind of remote control, together with an accurate picture of conditions at distant unattended stations, is made possible by a complex new alarm and control system recently installed on the 650-mile coaxial cable route between Dallas and El Paso, Texas.

The new device is designated to take care of as many as 10 main repeater stations. The Dallas-El Paso line was chosen as the first installation because the new system is expected to be especially valuable in safeguarding service along coaxial routes where attended offices are widely separated. Between these two cities there are three unattended and two partially attended main repeater stations.

As an alarm, the new system can indicate about 160 different conditions in each subordinate office—conditions such as fire, unlawful entrance or a low supply of gasoline for the emergency power engine. As a control device, the system enables 100 specific operations to be performed at each unattended office. Examples: switching from one coaxial line to another, starting the emergency gas engine and locating the exact spot of transmission troubles along the route.

When trouble occurs at an unattended station, an alarm signal is immediately transmitted to the control station. There a maintenance man dials a code back to the unattended office to find out the difficulty. In answer, the equipment at the distant point lights up signal lamps indicating just what is wrong. The maintenance man then sends out another code and equipment starts to take care of the trouble.

Portable Class-Room Unit Brings School To Shut-Ins

THE CLASSROOM can, in effect, be brought into the homes of "shutins" by means of a service now being offered by Bell Companies. By

means of intercommunication systems linking their homes and schools, incapacitated students are able to listen in to regular classroom activities and recite as if they were seated at their school desks.

The equipment which permits them to join their classmates by remote control consists of a portable classroom cabinet containing a combination speaker-microphone and a separate amplifier, both located at the school. For the home-bound student, there is a cabinet with a combined amplifier and speaker-microphone equipped with a *listen-talk* switch and volume control. The school and home units are interconnected by private telephone wires.

When the switch is on *listen*, the "shut-in" student can hear familiar classroom sounds: the words of the teacher, the recitation of other students, the rustle of paper, the squeak of chalk on the blackboard. When called upon, the student at home pushes the switch to *talk* and his voice is broadcast to his remote classmates.

If the handicapped student is "attending" a class that moves from room to room during the day, the portable classroom unit is carried along with the class and plugged into jacks provided in each of the rooms. Another feature of the service is that several "shut-in" students with individual home stations may "attend" the same class through the single classroom unit.

The service is not intended to replace home instruction, but rather to supplement it. The use of such a system permits fewer or shorter visits by home instructors, enabling them to serve more students or spend more time with those who are unable to use the service.

Several Bell companies have experimented with arrangements of this nature for aiding incapacitated students. The results have been highly satisfactory and there has been increasing interest in this type of service on the part of parents, educational authorities and other organizations concerned with child welfare and progress.

Determining Proper Guying Direction and Pull

WHEN A GUY is placed at a corner pole, it should be located to bisect the angle of the pole lead. If this is not done, the top of the pole will bend over, throwing slack into the pole lead on one side and putting excessive tension in the line conductors on the other side of the angle. This may result in failure of the line during a severe storm.

It is entirely feasible to bisect the angle of a pole lead by measuring off equal lines on the sides of the angle and then extending another line from each end point to meet one another at the bisection of the angle, the extending lines being also equal in length. This, however, can be done only with considerable effort, particularly when the terrain is rough and uneven. The usual result is that the construction men are content merely to pace off the lines to determine the bisecting point, or in particularly bad situations, they prefer to guess the location of the bisecting point. The instrument shown in *Figure* 2 is designed to do away with this nuisance. The spiked tip of the bisector is driven lightly into the pole to be guyed and the arms are aimed at the poles to the right and to the left, as shown in *Figure* 3. The peepsight barrel is adjusted over the center of each arm in turn, until it is perfectly aligned with the right and left poles as indicated in *Figure* 4. The tail piece then automatically indicates the correct position for the anchor.

The bisector has another feature that makes it valuable for determining the pull at the corner pole. This is a "pull" and interior angle scale. By checking the scale readings on the tail piece, after bisecting the angle, the pull can be determined. From tables of guy strand sizes for pull at corner and angle of guy, the proper size of strand can then be ascertained.

Plastic Tube Guards On Open-Wire Lines

IN SITUATIONS of tree interference on open-wire lines, where tree trimming or removal is not permitted or would not be economically feasible, plastic tubes ½-inch in diameter can be used on the line conductors at locations of foliage contact with the line wires. These tubes are held in place on the wires with test clamps or split compression sleeves of the type used for making tap connections.

On dial and common battery lines, it is necessary to place the plastic tubes on all wires likely to be in contact with foliage, to avoid leakage of battery to ground and noise problems. In the case of magneto lines, only one conductor of each pair of line wires used this protection as the primary purpose is to prevent the tree branches from whipping the wires together.

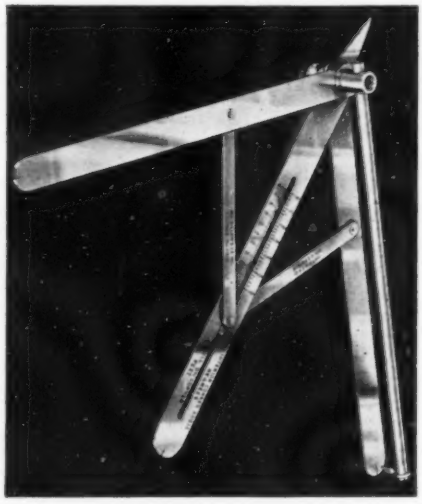


Fig. 2—Dillon Bisector with "pull" scale.

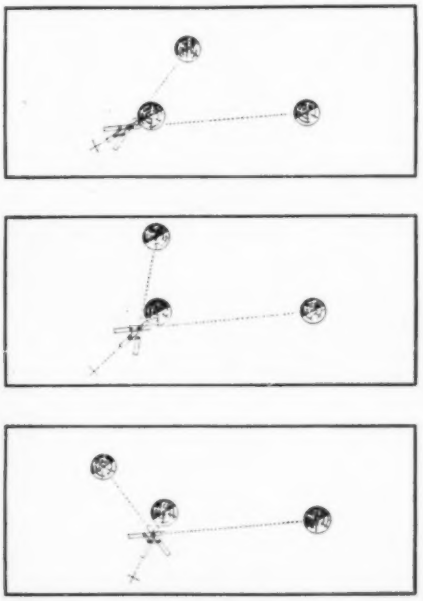
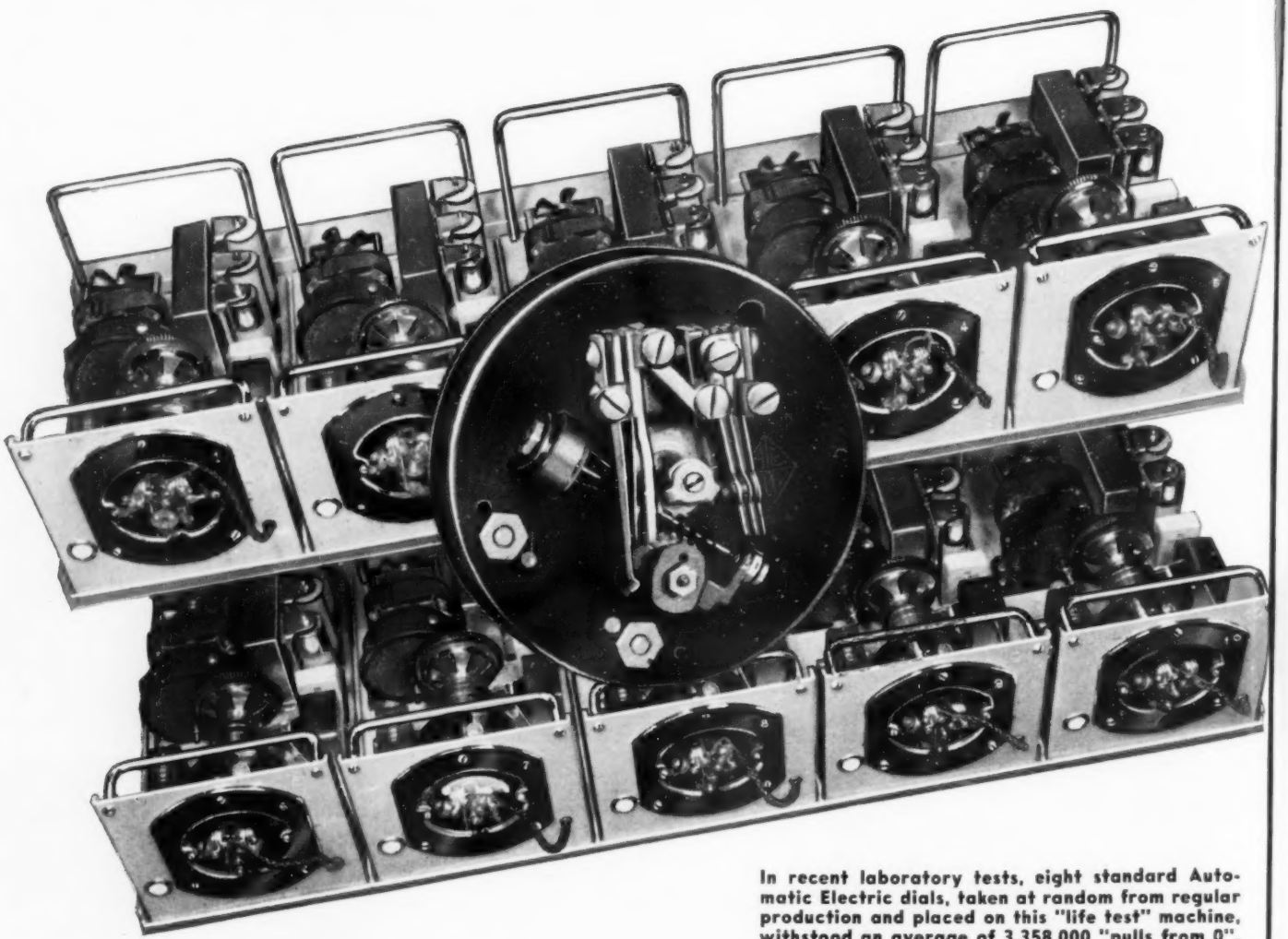


Fig. 4—Illustrated above are several typical anchor problems quickly solved with the Dillon Bisector. Note how outer arms point toward right and left poles. Cross back of center arm indicates exact bisected angle along which guy should point.

Fig. 3—Showing how the Dillon Bisector is used.

For Long Life and Low Mat

It's AUTOMATIC



In recent laboratory tests, eight standard Automatic Electric dials, taken at random from regular production and placed on this "life test" machine, withstood an average of 3,358,000 "pulls from 0", or 33,580,000 pulses, with practically no attention. Based on heavy traffic (twenty 5-digit calls per day), this performance is equivalent to an average dial life of 184 years. It is typical of the endurance and low maintenance for which all Automatic Electric equipment is famous.

Maintenance
ELECTRIC

CHECK the records of operating companies that show consistently good earnings, and you'll find that, almost invariably, they are companies with low maintenance costs. These companies select their equipment to assure low costs over the years—and this policy always pays out!

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QUESTIONS and ANSWERS

EDITED BY

Jay G. Mitchell

This month Mr. Mitchell answers questions on, (1) Grounded telephone circuits in Joint Pole Line Construction, (2) Inoperative telephone ringers on telephone line in parallel with supply circuit, (3) Railroad Crossing by grounded telephone lines, and (4) Anti-sidetone transmitter in operator's telephone set.

Question:—I plan to build about two miles of single line for a telephone line and there are seven R.E.A. poles that are exactly where I want to build the line and I have permission to use these poles if I build the line according to National Code. The thing that troubles me is this: That I do not know how to get rid of high line induction with a single wire. I know how to transpose the line, that is a double line, but is there anything that I can do with a single line? I only want to use about three fourths of a mile of R.E.A. poles and then hook on to a single line that is already built about three miles farther to the switchboard. Do you think that I will be troubled much with induction from this three fourths miles of high line? The line that is already built is not on R. E. A. poles and the nearest that it is to a high line is that it runs on the other side of the highway from one and it runs that way for about one half mile. The bottom wire on the highline is grounded and I will be about three feet or more from it, that will make the line that I build about six or more feet from the top or hot wire. I would build a two wire line if there was anything for me to hook onto but there is only a single line for me to hook onto. The high line carries 6,600 volts.

Answer:—Any telephone line should be kept at highway separation, *at least*, from an R.E.A. circuit carrying 6,600 volts *whether it is metallic (two wire) or not.* A grounded telephone line on R.E.A. poles is *bound* to be subject to inductive interference. This circuit should be built on *another pole line at highway separation from the R.E.A.* Preferably, even then if it parallels the R.E.A. circuit it should also be metallic and transposed. The way to connect a two wire metallic circuit to a single wire grounded circuit is by installing repeating coils at each end of the metallic segment.

Free Help on Problems

IF YOU'D like Jay G. Mitchell's technical and helpful opinion on some question, a postcard will bring you a reply in these columns. Or if you're in a hurry, please send along a stamped self-addressed envelope for immediate reply.

Let TELEPHONE ENGINEER tackle your problems when you do not have the answer. This is a free service. Your question and the resulting answer may not only solve your problem but also help the many other telephone men reading these columns.

Question:—We have a telephone line 18 miles long. The line is built with number 9 galvanized wire. It is supported on glass insulators and good poles about every 50 yards. There is a power line that parallels the telephone line. We have on the line 11 new Bantam Wall Telephones with 1600 ohm ringers and one old box. Our trouble is the boxes do not ring right. The ringer sticks and will not ring until it is released. It will ring a few times and then stick again. Will you please tell us what the trouble is?

Answer:—This query does not give all the desirable information for a complete answer. For instance are all the telephone ringers bridged on the line and is the line itself a metallic circuit (two wire). If the line is a grounded line (one wire) it is quite probable that there is an induced current flowing along the telephone wire which is sufficiently strong in one direction to cause the telephone ringers to freeze their armatures in one position with sufficient magnetic pull to resist the normal ringing current effect. In that case the remedy is in biased ringers. A better solution is to move the telephone line away from the power circuit as least as far as the width of the highway. The inquiry does not state how many telephones are connected to the telephone circuit and this item of information may have a bearing on the matter.

Question:—Ours is a small rural telephone company mostly grounded lines. Part of our wires go above the Railroad and we have received notice to raise them to 27 feet. We would like to get away from climbing high poles but after rebuilding after two sleet storms we would like to avoid the extra expense of a cable and the can tops for going under the two railroad tracks.

Could we solve the problem by putting 20 Neoprene wires in a two inch iron pipe under the tracks according to the diagram below.

The poles would be anchored and the two inch pipe would have a sufficient fall to drain and with a cap at the upper end to keep the rain out.

The neoprene wires to hang rather

loose and be joined to the line wires by Nicropress sleeves.

What gauge of Neoprene wire should be used and how long could we expect the insulation to last.

Would there be cross talk because of the wires being so close together for the 110 feet.

Would this plan be feasible or advisable, and if so, what suggestions have you for carrying it out.

Thank you very much for your answer to the above.

Note: The sketch referred to shows two railroad tracks parallel to each other with a two inch iron pipe 110 feet long running across and below the tracks with one end of the pipe lower than the other in order to insure drainage.

Answer:—It will probably be necessary to secure permission in writing from the railroad companies involved to place a pipe across their right of way underneath their tracks. The wisdom of placing twenty grounded circuits in a two inch iron pipe for a distance of 110 feet is open to doubt. In the first place it might be difficult mechanically to pull twenty separate wires through that length of two inch pipe. In the second place the placing of twenty single wire telephone circuits in close proximity with each other would almost certainly cause transmission difficulties such as cross talk and high loss. From the transmission standpoint it would be advisable to do one of two things. Either set the required high poles and continue the lines across the railroads in open wire at normal separations: or install twenty pair telephone cable in a pipe underneath the tracks and insert a repeating coil in each circuit so that it would be working metallic through the pipe. By twenty pair telephone cable I do not necessarily mean paper insulated cable although that would probably be the best but I mean cable in which the wires are in twisted pairs so that two wires are used for each circuit.

If single wires for twenty grounded telephone circuits are installed in an iron pipe as suggested the transmission on all or most of the circuits is certain to be impaired, no matter what kind of wire is used. If cable is installed a cable terminal, of course, will be necessary at each end of the short cable run.

Question:—*We recently got an operator's head set and transmitter, Western Electric 52 A, which we are now using on our magneto board, but transmission is poor.*

Please advise me at your earliest convenience what type induction coil and how much battery to use for maximum performance with this type operator's set. I understand that the set was designed for common battery use but would like to use it on our board if possible.

Answer:—The Western Electric 52 A head set is the latest type of anti-sidetone equipment available. It is possible that the operator, in this case, assumes that the transmission is poor because of the anti-sidetone performance. However it will be advisable to have all information as to the battery which is now connected to this set, the type and number of the coil equipment and a sketch of the operator's set wiring and connections. Please send this information in as soon as possible for our study.

Tensleep (Wyo.) Company To Serve Rural Area

Residents of the rural areas in the vicinity of Tensleep, Wyo., will soon have telephone service, according to an order entered by the Wyoming Public Service Commission.

Dwight Dahlmann, secretary of the PSC, announced that the commission has authorized the Tensleep (Wyo.) Telephone Co. of Tensleep to operate and maintain a telephone system between Tensleep and Worland and Tensleep and No Wood, a small community 45 miles south of Tensleep. The system will give telephone service to residents along the foothills of the Big Horns between Tensleep and No Wood.

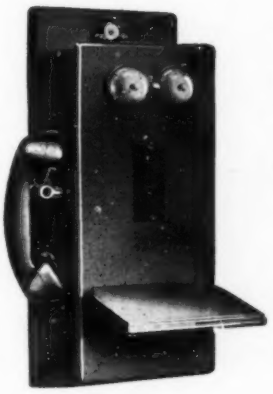
In July, 1948, the commission cancelled the certificates of the Red Bank Telephone Co. of Tensleep which formerly operated the system for abandonment of service, and residents in the rural areas in that vicinity have since been without telephone communications either in the area or to Worland, the county seat.

Elmore Telephone Co. Granted Charter

The Elmore Telephone Company, Brownsville, Ky., has been granted a charter with $30,000 capital stock to operate in Edmonson, Ky., and in parts of Warren and Barren counties. Listed as incorporators, were Cecil Elmore, Noah Elmore, and Christine Elmore.

ANOTHER DAN-MAC TELEPHONE

Satisfaction Guaranteed



Independent telephone men have been avoiding trouble and saving many dollars by installing Dan-Mac "Like New" telephones. An outstanding money saver for you is the handset wall model pictured.

A smaller beautifully grained oak cabinet as well as guaranteed operation assure subscriber acceptance.

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3-bar, 1000 or 1600 ohm	**$21.00**
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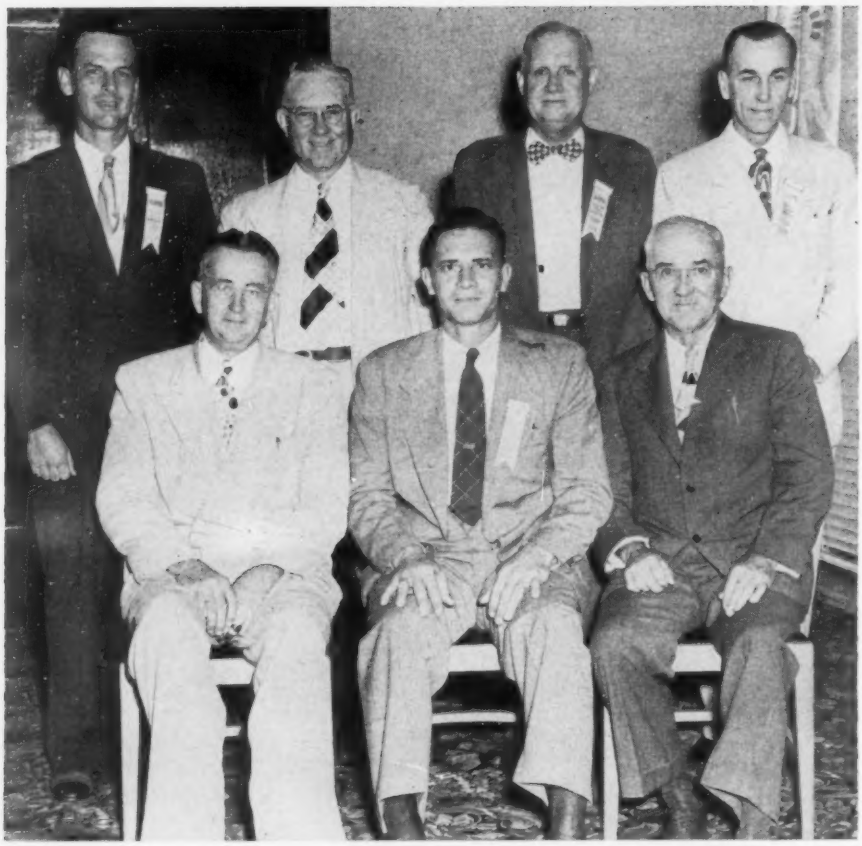

Board of Directors, Louisiana Telephone Association: (standing, l. to r.) CLARKE WILLIAMS, H. P. CARTER, W. L. HENNING, EARL CONRAD; (seated, l. to r.) AL COBB, JOHN A. BRADY, SR., J. M. NELSON.

Louisiana Independents Organize State Association

THE TELEPHONE companies of the state of Louisiana, along with manufacturers, distributors and their representives met at the Bentley Hotel, Alexandria, La., July 8-9th to organize the Louisiana Telephone Association. The following companies were represented: Avoyelles Telephone Co., W. J. Camp, Sr.; W. J. Camp, Jr.; Bethany Converse Tel. Co., L. R. Hagin; Breaux Bridge Telephone Co., Earl Conrad; Cameron Telephone Co., W. L. Henning and W. T. Henning; Forest Hill Telephone Co., G. D. Mizell; Lafourche Telephone Co., John A. Brady; LaSalle Telephone Co., Al Cobb; Oak Grove Telephone Co., L. R. Hagin; Oak Ridge Telephone Co., C. M. Williams; Reserve Telephone Co., Daniel Madere; Ringgold Telephone Co., C. C. Tomme; Southern Bell Telephone Co., Hooper Carter, Carmen Daniels, R. N. Phaff, M. C. Jauchler; Southwestern Associated Tel. Co., Ray F. Red; Southwestern States Tel. Co., J. M. Nelson; Springhill Telephone Co., Ed. Schultz, and Plain Dealing Telephone Co., Geo. L. Lee.

Constitution and by-laws (drawn up by a committee consisting of J. M. Nelson, Ed Schultz, L. M. Cobb, John A. Brady, Sr. and C. F. Bodin) was presented by Mr. Brady, who served as chairman of the convention until the officers were elected. After the adoption of the constitution and by-laws the following were elected to the board of directors to serve for the terms indicated:

One year: Ed. Schultz, Earl Conrad, W. T. Henning; *Two years*:

(*Please turn to page 46*)

H. P. CARTER (left), JOHN A. BRADY, SR. (center), and GEORGE C. RICHERT, USITA secretary, photographed at Louisiana Convention.

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with reversible safety point

Recommended for raising t
ephone or power poles, a
as ground braces in po
setting work. Made fro
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from defects and lacquere
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MBERG-CARLSON recommends...

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is pre-tested to operating company requirements

Before a single inch of Kennecott cable leaves the mill, it is tested for Dielectric Strength, Insulation Resistance, Conductor Resistance, Capacitance and Fixed Dimensions. Such care in manufacture is your warranty of efficient, trouble-free performance in the field. Specify "Kennecott"—distributed by Stromberg-Carlson.

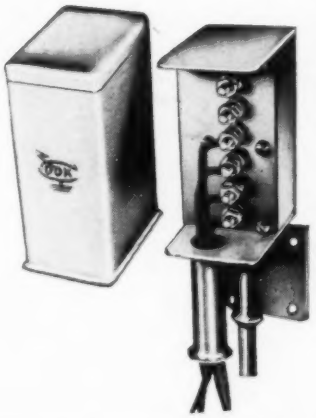
for shorter drops... less bracket lines

cook 3-pair XB terminal

An addition to the well-known XB family of unprotected terminals, this development provides far better, more economical means of subscriber distribution out of rural cable.

The 3-pair XB Terminal was especially designed to reduce to a minimum all factors that would cause high resistance and the possibility of line leakage and maintenance. Hence the heavy, close-fitting welded zinc cover; the noncorrosive Monel faceplate on which are mounted the highly insulated cable studs; the use of the flanged tube as an entrance for drop wires. This tube can be completely sealed after the drop wires are installed.

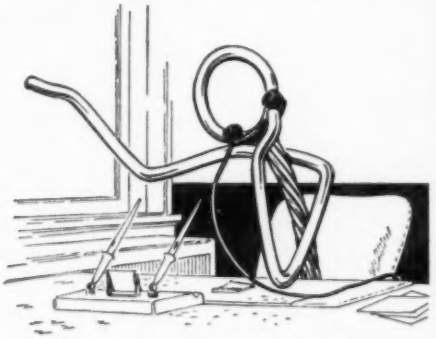
The new Cook Terminal measures 7½" high, 3¾" deep and 2½" wide. It is furnished with or without cable stub, to user's specification.



Copperweld Line Wire

TRADE MARK

SPEAKS FOR ITSELF:



High in conductance—with better voice and high frequency transmission characteristics than any other high-strength conductor . . . **that's Copperweld.**

Permanently protected against rust—2 to 3 times stronger than hard-drawn copper wire—greater tensile strength than any wire having comparable electrical properties . . . **that's Copperweld.**

Light in weight—small in diameter—pliable—and easy to string . . . **that's Copperweld.**

Unsurpassed for economy because it lasts so much longer and requires so little maintenance . . . **that's Copperweld.**

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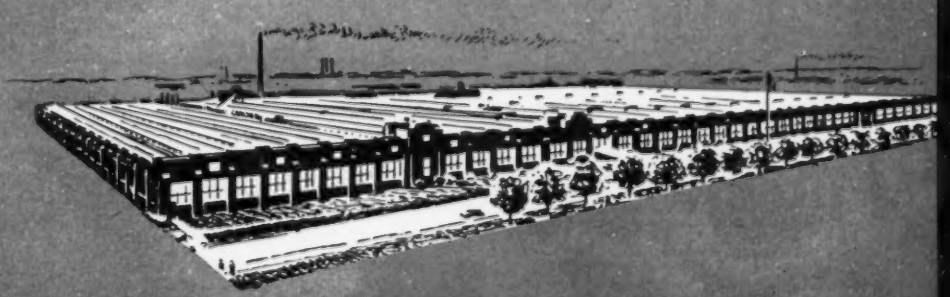

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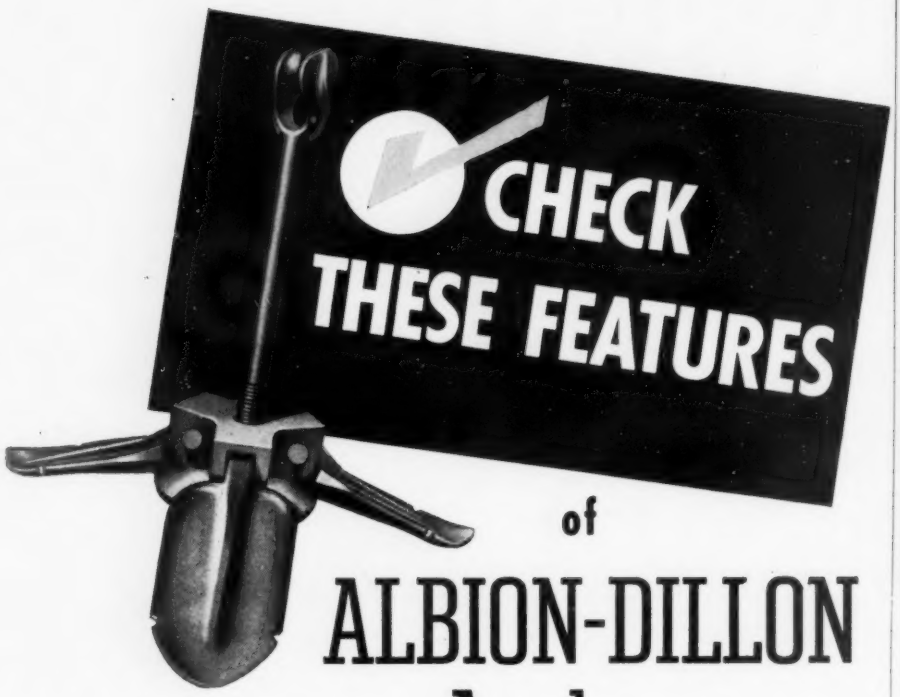

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- ✔ Made of High-Strength Malleable Iron
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- ✔ Three Long Blades Extend Deeply in Solid Earth
- ✔ Lasting Strength Gives Them Lasting Holding Power
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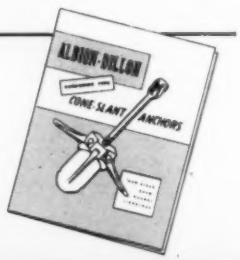
For dependable guying under all conditions, rely on Albion-Dillon Expanding Type Anchors, made of malleable iron for *lasting* strength. Pull tests prove that A-D Anchors will withstand up to 46,000 lbs!

When you add up all the features, as listed above, you can understand why large companies are now specifying A-D Anchors in increasing numbers.

Send for Folder!

If you are not familiar with A-D Anchors, send for descriptive folder which includes specifications.



ALBION MALLEABLE IRON CO.
"One of America's Foremost Producers of Malleable Iron"
ALBION, MICHIGAN

BERT HOLDERMAR, left, congratulates JOHN A. BRADY, SR. on his election as president of the Louisiana Telephone Association.

N. J. Camp, Clarke Williams, J. M. Nelson; *Three years*: John A. Brady, Sr., Al. M. Cobb, H. P. Carter.

Officers elected are: President, John A. Brady, Sr.; first vice president, J. M. Nelson; second vice-president, Ed. Schultz; treasurer, Al. M. Cobb; secretary (to be appointed by board of directors).

The Executive Committee consists of the following members: John A. Brady, Sr.; H. P. Carter; Earl Conrad; J. M. Nelson, and N. J. Camp.

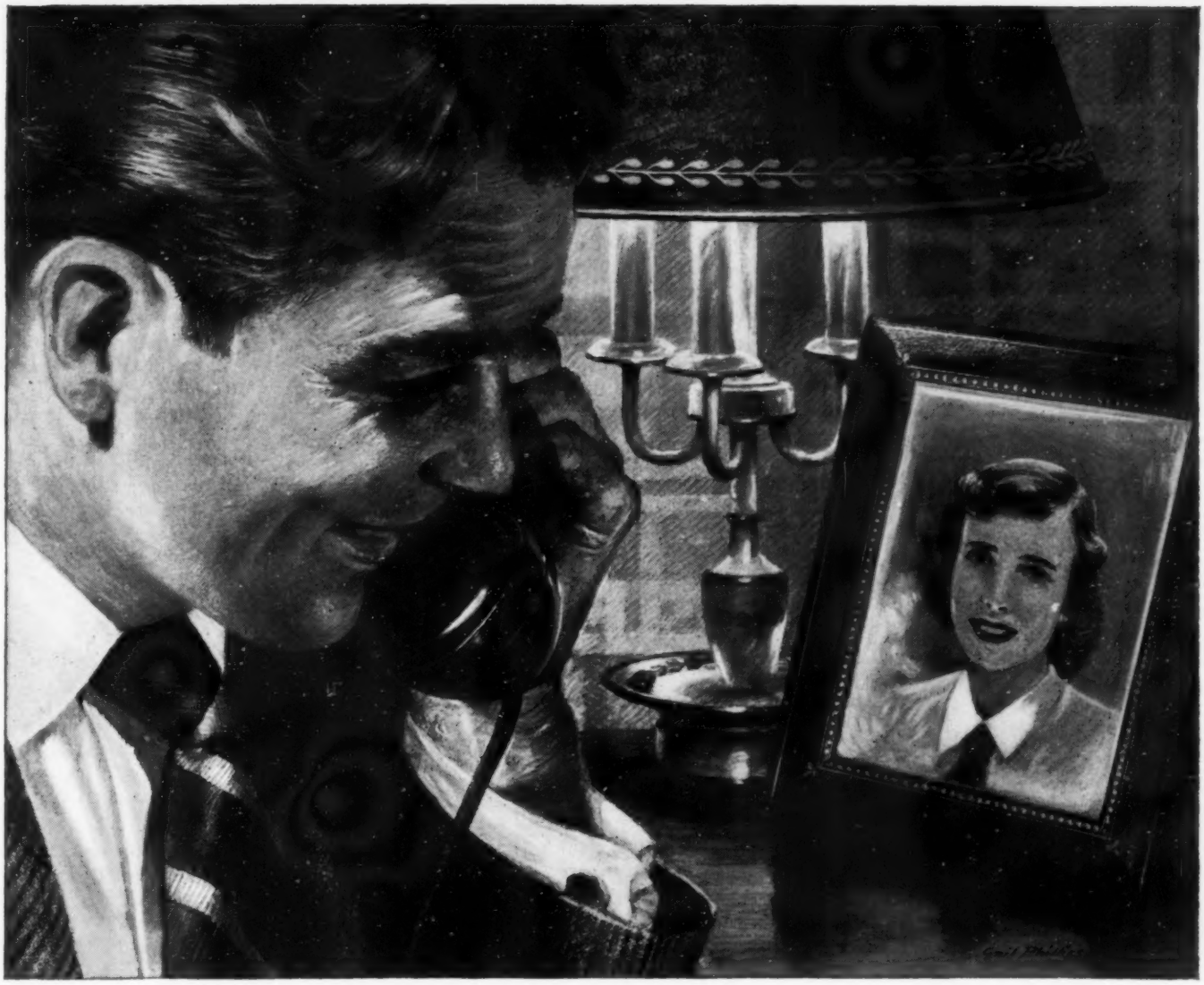
Speakers included: George C. Rickert, secretary of the United States Independent Telephone Association, Washington, D. C.; N. I. Nichols, chief accountant, Louisiana Public Service Commission; Ray F. Red, general commercial superintendent, Southwestern Associated Telephone Co., and Ben H. Hatfield, Southern Bell Telephone & Telegraph Company.

Co-op Purchases Nelson, Wisc., Company

The sale of the Nelson (Wisc.) Telephone Co. to the Nelson Telephone Co-operative has been approved by the Wisconsin Public Service commission.

The cooperative is headed by William Weisenbeck, Durand, Wisc., as president. Christ B. Ness of Nelson is secretary-treasurer and E. S. Pattison of Durand is legal counsel.

The Nelson Telephone Co. has for many years been operated by P. M. Jacobson, majority stockholder and a number of associates.



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That remark sounds wonderful to us, too, because it could be prompted only by *good telephone service.* As a manufacturer of many kinds of telephone equipment, Western Electric contributes toward giving the service people like. Thus, we share with the nation's telephone industry the satisfaction of the young man above. Speeding her voice to him so clearly, so naturally, is something to be proud of. *Good telephone service* like this gives people a lot of satisfaction.

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TELEPHONE APPARATUS AND CABLE

RUNZEL CORDS

FOR Every TYPE INSTRUMENT

Finest workmanship in the trimming operation.

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Constant and varied inspections during the process of manufacture.

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these features assure a consistent quality cord in every detail and are responsible for the clarity of reception for which RUNZEL CORDS are popularly known.

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We carry large stocks of cords for all types of telephone service. Whether you need one cord —a dozen—or a quantity, you'll get prompt service on your order. Emergency requirements are given special attention.

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Kirchoff's Laws

(*Continued from page 28*)

in Fig. 2 it appears to be obvious that the total current strength through the battery is equal to the current in amperes flowing through the resistance "G" *plus* the additional current in amperes flowing through the resistances "B" and "C" which are in series with each other. This relation between the three current strengths in the three loops can be most simply stated by the use of symbols. If the total current strength in amperes flowing through the battery be designated by the letter "I", the current strength flowing through the resistance "G" by the letters "II" and the additional current strength flowing through resistances "B" and "C" by the letters "III" their relative values may be expressed as follows:

$$II = I - III \qquad (4)$$

Considering for the moment the closed circuit loop in Fig. 2 which is indicated by the reference letters K, H, A, E, G, F, D, K and remembering that the voltage drop in an electrical conductor is:

$$E = I\,R \qquad (2)$$

we may make an application of Kirchoff's second law and it will be expressed as follows:

$22-6(I)-5(I)-12(II)-20(I) = 0$

This expression is developed by indicating the E.M.F. of the battery in positive volts because it causes the current to flow in the circuit and the drop in voltage in the several resistances (Amperes multiplied by Ohms) negative because they retard the current flow. By combining like terms this expression becomes:

$22 - 31(I) - 12(II) = 0 \qquad (5)$

Considering the closed circuit loop in Fig. 2 which is indicated by the reference letters K, H, A, E, B, C, F, D, K and remembering the way in which the voltage drop in an electrical circuit is expressed in terms of the amperes and resistance we may make an application of Kirchoff's second law which will be expressed as follows:

$22-6(I)-5(I)-10(III)-15(III)-20(I) = 0$

By combining like terms this expression becomes:

$22-31(I)-25(III) = 0 \qquad (6)$

Now expressions (5) and (6) may obviously be rewritten as follows without changing any values:

$22 = 31(I) + 12(II) \qquad (5)\ (7)$

$22 = 31(I) + 25(III) \qquad (6)\ (8)$

Now $(II) = (I)-(III) \qquad (4)$

and using this value of (II) in expression (7) as a substitution for (II) simplifies expression (7) to:

$22 = 31(I)+12[(I)-(III)]$ which by combining terms becomes:

$22 = 43(I) - 12(III) \qquad (9)$

Since equations (8) and (9) are simultaneous they are solved for (I) by multiplying (9) by 25 and (8) by 12 and then adding the two equations as follows

$550=1075(I)-300(III) \qquad (9)$

$264= 372(I) + 300\ (II) \qquad (8)$

Adding (8) and (9) gives:

$814=1447(I)$

$0.563=(I)$

The strength of the total current (I) in amperes flowing through the battery which, it will be remembered, is equal to the combined current flowing through resistance "G" and that flowing through the closed circuit loop including resistances "B" and "C" is 0.563 amperes. It is to be noted that the connection of the resistance "G" between the points "E" and "F" in the network shown in Fig. 1 has had the effect of reducing the aggregate resistance of the circuit into which the battery is sending its current sufficiently to cause an increase in the output current of the battery from 0.393 amperes to 0.563 amperes.

In developing the expression for the current flow in the circuit K, H, A, E, B, C, F, D, K in Fig. 2 the relation between the resistances and current in the several conductors is finally expressed as follows:

$22 - 31(I) - 25(III) = 0 \qquad (6)$

The value of (I) has been found in the solution above to be 0.563. By substituting this value of (I) in equation (6), since (6), (7) and (8) are simultaneous, the value of (III) is found. This substitution in equation (6) results in:

$22-17.453-25(III)=0$

which is:

$4.547=25(III)$

$0.182=(III)$

The value of (I) and (III) has been found. Referring to equation (4) and substituting the values of (I) and (III) the strength of the current through the resistance "G" is determined as follows:

$$II = I - III \quad (4)$$
$$II = 0.563 - 0.182$$
$$II = 0.381$$

In order to verify this computation consider the circuit loop K, H, A, E, G, F, D, K. This expression has already been shown and simplified resulting in equation (5). By subtracting equation (5) from equation (6) the result is

$$22-31(I)-25(III)=0 \quad (6)$$
$$22-31(I)-12(II)=0 \quad (5)$$
$$12(II)-25(III)=0$$
$$12(II)=25(III)$$

But (II) is 0.381. Therefore:

$$4.572=25(III)$$
$$1.83=(III)$$

(This was found to be 0.182 above)

The solution of the current distribution in Fig. 2, therefore, discloses the following values:

$$I = 0.563 \text{ amperes}$$
$$II = 0.381 \text{ amperes}$$
$$III = 0.183 \text{ amperes}$$

The two different values found for III (0.182 and 0.183) are due to the fact that the decimal was carried to two places only.

In passing it is worthy of note that the connection of the conductor having a resistance of 12 ohms between the points "E" and "F" in Fig. 2 resulted in an increase of the total current output of the battery from 0.393 amperes to 0.563 amperes. The difference of potential between the points "E" and "F" may, therefore, be determined by the application of equation (2) as follows:

$$E = IR \quad (2)$$
$$E = 0.381 \text{ times } 12 = IR$$
$$E = 4.572 \text{ volts}$$

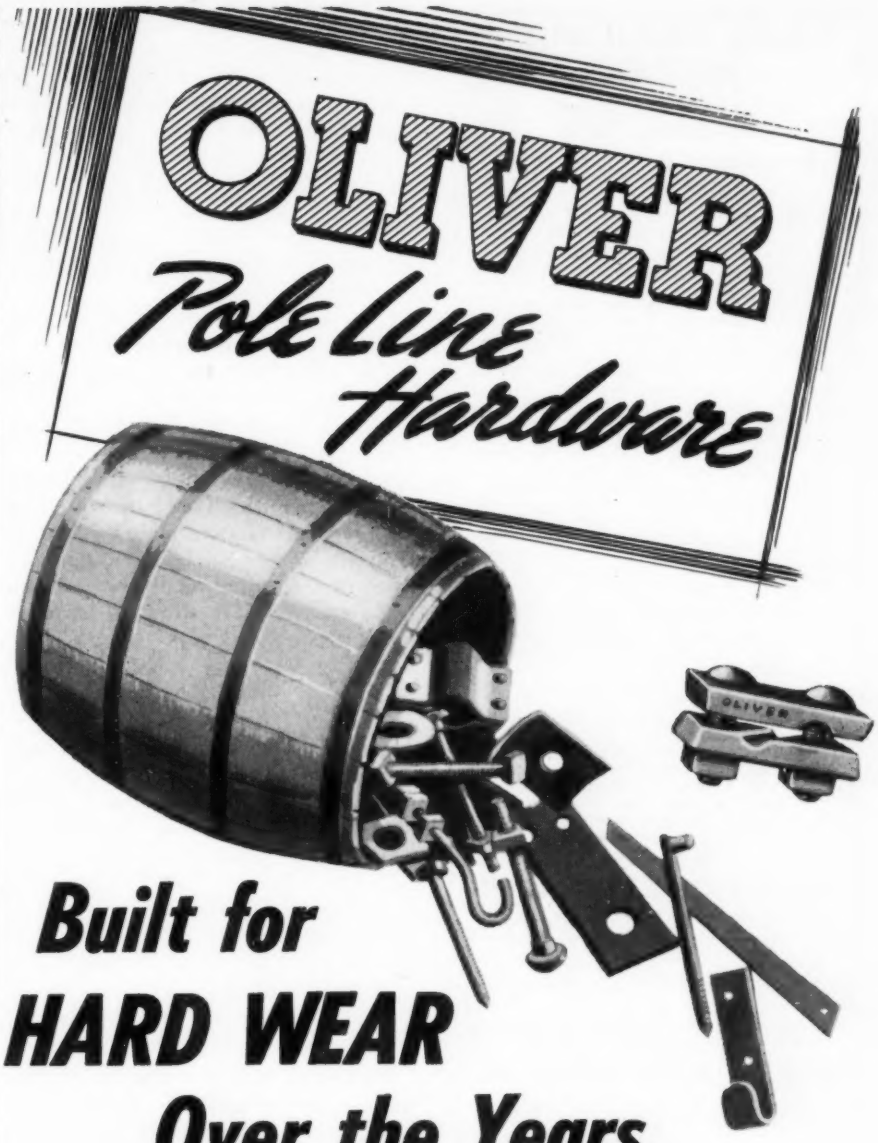
This result may be checked by computing the drop in voltage in resistances B and C under the loop conditions shown in Fig. 2 as follows:

Current Strength (III) 0.183 amperes; Drop in B at current strength of 0.183 amperes equals 10 times 0.183 or 1.83 volts Drop in C at current strength of 0.183 amperes equals 15 times 0.183 or 2.75 volts; 1.83 volts plus 2.75 volts is 4.58 volts

This is substantially in accord with the difference of potential at the points E and F as it has been computed by substitution in equation (2). The difference between the two results (4.58 and 4.57) is due to the fact that decimals were not carried out beyond three places.

IT IS POSSIBLE, of course, by an application of Ohm's Law to determine the resistance of the elements comprised in a simple direct current electrical circuit when the strength of the current in the circuit in amperes and the drop in potential at the

(*Please turn to page* 50)



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PERSONNEL MANAGEMENT

Principles, Practice, and Point of View

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terminals of the elements of the circuit are known. Because of the close relationship of this application of Ohm's Law and of Kirchoff's two Laws it will be helpful to consider briefly the conditions illustrated in Fig. 2. The solution of the circuit conditions shown diagrammatically in the figure resulted in disclosing current strengths in the three loops as follows:

I 0.563 amperes, total current through the battery
II 0.381 amperes, current through loop KHAEGFDK
III 0.183 amperes, current through loop KHAEBCFDK

As shown in the primary discussion, Ohm's Law, which can be stated in three forms may be stated in equation (2) as $E = IR$. Dividing both sides of this equation by I results in a statement of the law in another form which is:

$$\frac{E}{I} = R \qquad (10)$$

A voltmeter applied to the terminals under the circuit conditions shown in Fig. 2 will indicate the drop in potential in each of the several elements of the circuit as follows:

Around A	2.82 volts
Around B	1.83 volts
Around C	2.75 volts
Around D	11.26 volts
Including all A to D	18.66 volts
Around G	4.57 volts

Substituting the strength of current values and the drop in potential values in equation (10) checks the resistances of the several elements as follows:

$$\text{Resistance A} = \frac{2.82}{0.563} \text{ or } 5 \text{ ohms}$$

$$\text{Resistance B} = \frac{1.83}{0.183} \text{ or } 10 \text{ ohms}$$

$$\text{Resistance C} = \frac{2.750}{0.183} \text{ or } 15 \text{ ohms}$$

$$\text{Resistance D} = \frac{11.260}{0.563} \text{ or } 20 \text{ ohms}$$

$$\text{Resistance G} = \frac{4.57}{0.381} \text{ or } 12 \text{ ohms}$$

The total Electromotive Force in the circuit loop which comprises the battery is 22.000 volts and the drop including items comprised in the balance of the same loop is 18.625 volts. The drop in the battery, therefore, is 22.000 minus 18.66 or 3.34 volts. By substituting this value for the battery in equation (10) the internal resistance of the battery is found to be:

$$\text{Battery Resistance} = \frac{3.34}{0.563} \text{ or } 5.93 \text{ (6.00) ohms.}$$

In discussing and solving the simple circuits shown in Figures 1 and 2 the conventional concept of the direction of electric current flow, from positive terminal of the source through external circuit to negative terminal, has been used. In communication circuits, however, it is the established practice to base the analysis of circuit performance on the direction of the *electron drift* rather than the more conventional and longer established concept. Because this is the case the following examples of the application of Kirchoff's Laws will assume the direction of the flow of the electric current to be the same as the direction of the electron drift. That is from the negative terminal of the source to the positive terminal through the external connecting circuit or loop. The reader will find upon trial that this concept will make no difference in the solutions reached for the circuits shown in Figures 1 and 2.—*(To be concluded in the September issue of TE&M.)*

F. G. Macarow Named Assistant V. P. of A. T. & T.

Frederick G. Macarow, vice president of The Chesapeake & Potomac Telephone Companies, has been appointed assistant vice president of the American Telephone & Telegraph Co., reporting to Bartlett T. Miller, vice president in charge of Bell System relations with the Federal Government departments and with other communications companies. The appointment became effective July 1.

Mr. Macarow has been vice president in charge of personnel of The Chesapeake & Potomac Telephone Companies since March 1 of this year. A native of Ashland, Pa., he began his telephone career in 1920 as a student engineer with the A. T. & T. Company. In 1928 he joined the traffic department of the C. & P. Company of Baltimore City, and the following year was appointed general traffic manager of the C. & P. Company in Washington, D. C. In 1936 he became general personnel manager for the four C. & P. companies.

Mr. Macarow was named assistant general manager of the Washington company in 1941, and vice president and general manager in May, 1948.

A HANDBOOK for Telephone Men

SUBJECT—Stringing Sags For Copperweld Telephone Conductors

INDEX: Open Wire Construction
DATE: August 15, 1949

TABLE 2—Short Spans—80 to 180 Feet

Stringing Sag in Inches

Span Length Feet	Temp. 0°F.	Temp. 30°F.	Temp. 60°F.	Temp. 90°F.	Temp. 120°F.
80	2.0	2.5	4.0	6.0	9.0
100	3.0	4.0	5.5	8.5	12.0
120	4.5	6.0	8.0	12.0	16.0
140	6.0	8.0	11.5	15.5	20.0
160	8.5	11.0	14.5	19.5	24.5
180	11.0	14.0	18.5	24.0	29.0

Stringing Tension in Pounds

Corresponding to above Stringing Sags

Temp. °F.	No. 8 Awg. (.128")	No. 9 Awg. (.114")	E.H.S. (.104")	H.S. (.104")	No. 10 Awg (.102")	"12-40" (.081")
0	221	176	146	146	139	88
30	166	132	109	109	105	66
60	118	94	78	78	75	47
90	84	67	55	55	53	33
120	63	51	42	42	40	25

Storm Load Capacity—in lbs. per foot at 0°F.

Maximum Conductor Tension, 60% Rated Breaking Load of 40% Conductivity Copperweld Wire

Span Length Feet	No. 8 Awg (.128")	No. 9 Awg (.114")	E.H.S. (.104")	H.S. (.104")	No. 10 Awg (.102")	"12-40" (.081")
80	3.17	2.70	2.85	2.37	2.28	1.67
100	2.54	2.16	2.28	1.90	1.82	1.34
120	2.12	1.80	1.90	1.58	1.52	1.11
140	1.82	1.54	1.64	1.36	1.30	0.96
160	1.59	1.35	1.43	1.20	1.14	0.84
180	1.43	1.21	1.28	1.07	1.02	0.75

These tables are based on usual stringing practices for telephone conductors. The sags are neither maximum nor minimum and considerable latitude is permissible to meet local conditions or the requirements of existing construction.

The following assumed storm loadings are representative of usual telephone construction practice: Heavy loading .5 lbs. per foot, Medium loading .3 lbs. per foot, Light loading .1 lb. per foot. These can be modified to conform to the particular line.

For the higher grades of construction where National Elec. Safety Code loadings apply the storm loadings for telephone wires are approximately as follows: Heavy loading .8 lbs. per foot, Medium loading .4 lbs. per foot, Light loading .1 lb. per foot. Exact loading may be obtained from Copperweld Wire Tables E.D. 1800 by subtracting the weight of the bare conductor from the total loaded weight.

(The tables and chart in this section are based on information given in Copperweld Engineering Data E.D. 1683 and are furnished by courtesy of the Copperweld Steel Company, Glassport, Pa.)

SOME POSTWAR ADVANCES IN TELEPHONY

There is always the constant search for ways to make telephone service better, and to extend its use to more and more people wherever they may be.

Some of the postwar advances made in the telephone art toward that end are shown in the advertisement on the opposite page. It appears in national magazines during August.

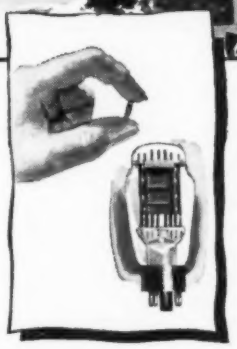
AN ADVERTISEMENT OF

THE BELL TELEPHONE SYSTEM

Big Things to Come in Telephone Service

FASTER, BETTER SERVICE MANY LONG DISTANCE OPERATORS NOW DIAL CALLS STRAIGHT THROUGH TO DISTANT TELEPHONES. NEW AUTOMATIC EQUIPMENT MADE BY WESTERN ELECTRIC SPEEDS THESE CALLS TO SOME 300 CITIES.
IN ADDITION, TELEPHONE CUSTOMERS IN CERTAIN METROPOLITAN AREAS ALREADY DIAL CALLS TO NEARBY PLACES IN THE SAME WAY THEY DIAL LOCAL CALLS.

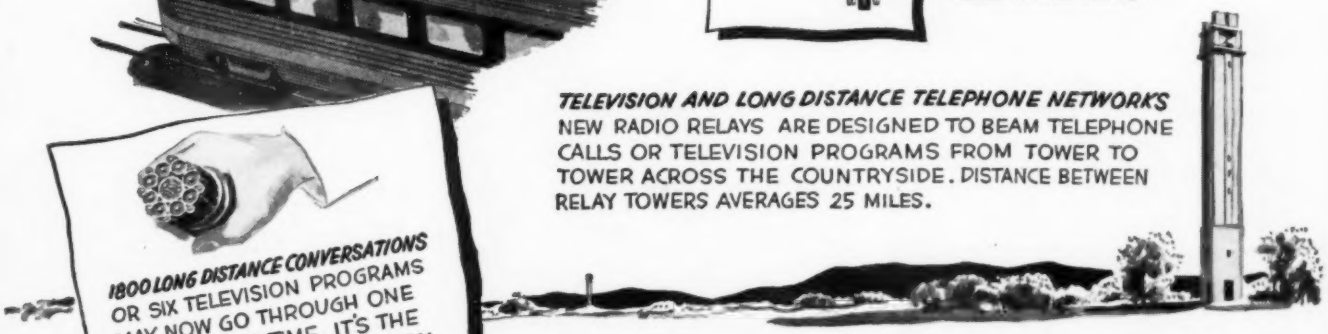
TRAVELING TELEPHONES THOUSANDS OF CALLS ARE NOW MADE DAILY FROM AUTOMOBILES, TRUCKS, SHIPS AND TRAINS. IT'S A BIG FIELD FOR THE FUTURE.



AMAZING NEW ELECTRONIC AMPLIFIER - THE TRANSISTOR DEVELOPED BY BELL LABORATORIES. NOT MUCH BIGGER THAN TIP OF SHOELACE. IT'S SIMPLE AND MUCH SMALLER THAN VACUUM TUBES THAT ARE USED BY THE THOUSANDS TO AMPLIFY YOUR TELEPHONE VOICE.

1800 LONG DISTANCE CONVERSATIONS OR SIX TELEVISION PROGRAMS MAY NOW GO THROUGH ONE CABLE AT ONE TIME. IT'S THE NEW COAXIAL CABLE. TELEVISION CHANNELS WILL DOUBLE THIS YEAR.

TELEVISION AND LONG DISTANCE TELEPHONE NETWORKS NEW RADIO RELAYS ARE DESIGNED TO BEAM TELEPHONE CALLS OR TELEVISION PROGRAMS FROM TOWER TO TOWER ACROSS THE COUNTRYSIDE. DISTANCE BETWEEN RELAY TOWERS AVERAGES 25 MILES.



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BELL TELEPHONE SYSTEM

R. A. Phillips Dies July 30; Industry Loses Valuable Leader

ONE OF THE outstanding executives of the Independent telephone industry, R. A. Phillips, president of Central Telephone Co. since 1947, who headed the United States Independent Telephone Association in 1941-42 and has been a member of its board of directors for 11 years, died at 2:15 a.m. July 30, in the Columbus Hospital, Chicago after a week's illness. He was only 44 years of age and was highly regarded throughout the entire telephone industry for his capabilities, constructive approach to issues and problems and intensive energy.

Mr. Phillips had had a career of two decades in the telephone industry, having started in 1928 as assistant general auditor of the Central Gas and Electric Co. He rose rapidly in posts to become assistant to president Max McGraw in 1932. He next served as vice president and general manager of the telephone properties from 1936-1947. He became president of the Central Telephone Co., an affiliate of Central Gas & Electric Co. when it was formed in July, 1947. The Central Telephone Co. operates the fourth largest group of companies in the Independent industry, serving more than 175,000 subscribers in 11 states.

Overwork and strain were thought to have contributed to Mr. Phillips' fatal illness which he first noticed on July 24 in his hotel after he had returned from his mother's funeral at Angola, N. Y. After an examination by the physician of the Central Telephone Co.'s Chicago attorney, he was rushed to the hospital and showed improvement at first. But then he took a turn for the worse and sank into a coma Thursday evening (July 28) which lasted until his death. The cause of his death was stated by Kenneth L. Dally, vice president of Central Telephone, to have been diagnosed as an arachnoid hemmorrhage.

Since the end of the war, Mr. Phillips had concentrated most vigorously in the expansion and modernization of the Central Telephone operating companies in the Middle West, West Virginia and Florida and Georgia. Through the expansion of their plants he and his associates had gained approval from state commissions for rate increases.

Mr. Phillips in his USITA activities headed several important committees at different times, including the Rural Telephone Service Committee and this year the Bell Acquisitions Committee. He also was a member of the Executive Committee for several years and Toll Compensation Committee. He likewise had participated in the activities of the Iowa Telephone Association being its president in 1941 and served several terms on its board of directors.

R. A. PHILLIPS

The electric utilities industry had also recognized the capabilities of Mr. Phillips. He was president in 1947 of the North Central Electric Association, which embodies the electric companies of that section of the country. Besides directing its telephone operations, Mr. Phillips held key executive posts in the electric and gas utilities activities of Central Gas & Electric which serves 72 communities in Nebraska and South Dakota.

During World War II, Mr. Phillips served with distinction on several key governmental bodies. He was a member of the Board of War Communications, representing the Independent industry; the Telephone Industry Advisory Committee of the War Production Board; and an industry member of the National War Labor Board's Telephone Panel and later Telephone Commission.

Born in Millom, England, April 12, 1905, he came with his family to this country as a child. After graduation from Norwood, N. Y., High School, he attended the University of Michigan, graduating with an A.B. degree in business administration in 1927. He joined the Chicago accounting firm of Allen R. Smart & Co. and as a result of a survey and report his firm made of Central Gas & Electric he attracted the attention of top executives of that company leading to the offer of a position.

Funeral services were held August 2 at the First Plymouth Congregational Church at Lincoln, Nebr., his home, and there was a large attendance of leading officials of Central Gas & Electric Co., the Independent telephone industry and Bell System as well as floral tributes from telephone executives from all sections. Interment was at Angola, N. Y., his family home. Besides his widow, Mr. Phillips is survived by his daughter, Barbara Ann; his father, the Rev. Joseph Phillips of Angola, and a sister, Mrs. Edith Thompson of Sioux City, Iowa.

Indiana Bell Losses Emergency Rate Rise Plea

The Indiana Public Service Commission denied the petition of Indiana Bell Telephone Co. for an emergency temporary rate increase of $3,800,000.

The commission held the company failed to show an emergency exists. It ordered hearings resumed on September 12 on the petition for a permanent rate increase filed November 19, 1948.

Intervenors from Michigan City, South Bend and New Albany, and from the Indiana Hotel Association joined Public Counselor William E. Steckler in opposing the temporary increase.

The company declared that, during the calendar year 1948, the company earned 5.25% on average net plant and 5.58% on average net capital obligations. For the six months ending March 1, 1949, the company earned 4.47% on average net plant and 4.72% on average net capital obligations, the company said.

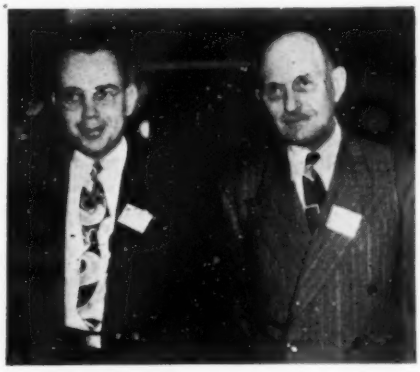
New System For Brownsville, Ind.

Engineering work will start immediately on a telephone system to be installed at Brownsville, Ind., by the Indiana Associated Telephone Corp., according to an announcement by Richard R. Mann, commercial manager. Actual construction work will begin as soon as materials and supplies can be accumulated.

Officers and directors of the California Independent Telephone Association, left to right: O. E. EMLEY, Sunland; F. H. MacGOUGAN, Monrovia; A. WARDMAN, Whittier; J. W. NEWMAN, Thermal; C. F. MASON, Santa Monica; LYNDON FARWELL, Los Gatos; WILLARD WADE, Bishop; F. V. RHODES, Santa Monica; RICHARD CROWE, Dos Palos. (California convention photos were taken by ROBERT G. YOUNG, Santa Monica.)

In attendance at recent convention of California Telephone Association were, (l. to r.) MRS. EDWIN M. BLAKESLEE and EDWIN BLAKESLEE, Santa Monica, and ARTHUR B. FRY, former member of California commission.

RAYMOND W. CLIFFORD, (left), Washington Public Service Commission, R. E. RUDOLPH, pres., Washington Association, EARL DEAN, pres., Oregon Association, and EARL GATES, vice pres., Washington Association photographed during joint meeting of Oregon-Washington Association.



TOM FEGAN (left), newly elected president of Kansas Telephone Assoc. and HERB COUCH, sec. of the Kansas association.

L. A. GRITTEN (right), sec.-treas. of the Oregon Telephone Association and J. W. BAKER, sec.-treas. of the Washington Independent Telephone Assoc.

K. C. TOMPERS (left), JIM MERRIAM and EDDIE SEARS, of Kellogg Switchboard & Supply Co., were among those attending joint convention of Oregon-Washington associations.

FRANCIS CROSBY (left), San Francisco, and HARLAN W. HOLMWOOD, Santa Monica, photographed at California convention.

Neoprene Jacketed Cable

(Continued from page 26)

where the individual conductors are connected to the proper terminals. Approximately 12 inches of the neoprene covering is removed by means of a stripping tool, as illustrated in *Figure 7*. None of the exposed conductors should be cut back to reach the nearer posts. Instead, the surplus length should be tucked inside the wire channel to provide a sufficient length to reach the proper terminals, in case of cable pair re-assignments.

Each pair of conductors is threaded through the proper hole in the fanning strip. Approximately one inch of the latex insulation on each conductor is stripped off with long nose pliers and the bared conductor connected to the proper terminal post.

When the wiring job is completed, the conductors are pressed back neatly in place in the wire channel and the terminal cover is replaced.

BEFORE attaching the drop cable to the building, the installer should always look for an entrance

(Please turn to page 58)

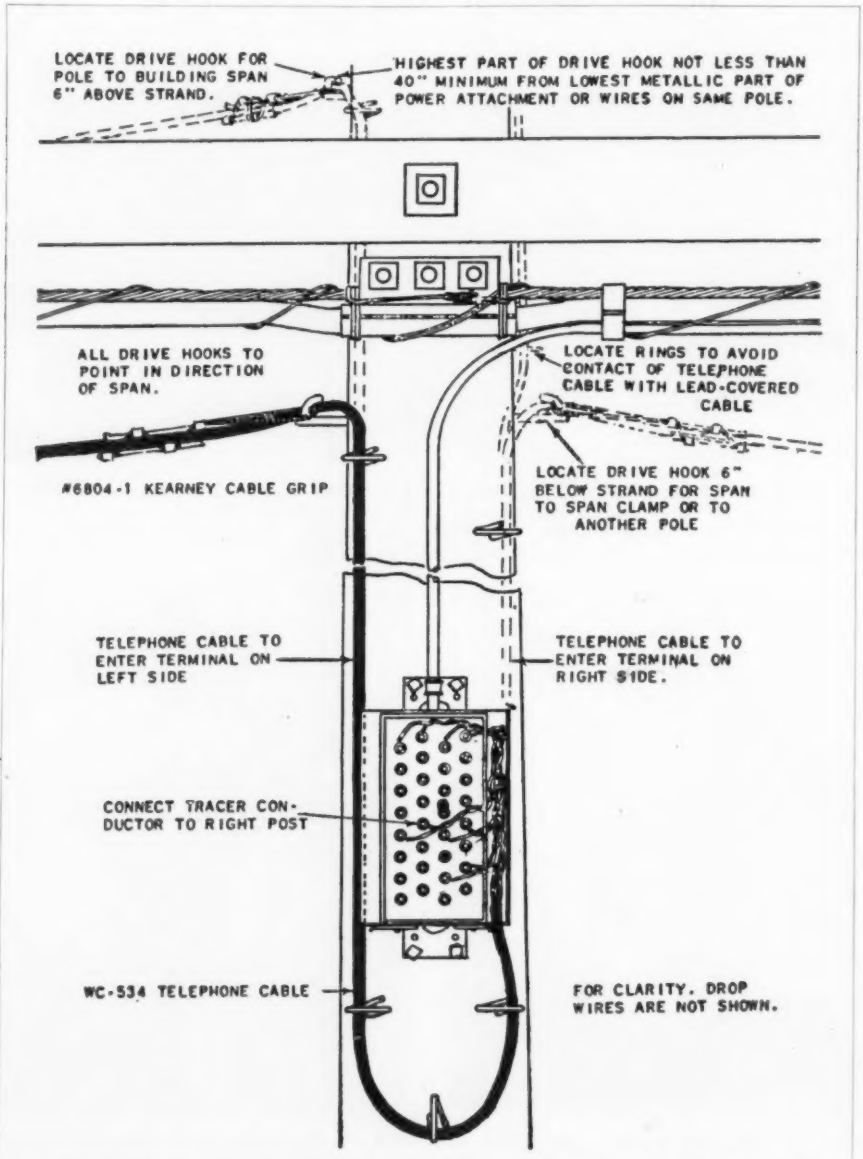

LOCATE DRIVE HOOK FOR POLE TO BUILDING SPAN 6" ABOVE STRAND.
HIGHEST PART OF DRIVE HOOK NOT LESS THAN 40" MINIMUM FROM LOWEST METALLIC PART OF POWER ATTACHMENT OR WIRES ON SAME POLE.
ALL DRIVE HOOKS TO POINT IN DIRECTION OF SPAN.
LOCATE RINGS TO AVOID CONTACT OF TELEPHONE CABLE WITH LEAD-COVERED CABLE
#6804-1 KEARNEY CABLE GRIP
LOCATE DRIVE HOOK 6" BELOW STRAND FOR SPAN TO SPAN CLAMP OR TO ANOTHER POLE
TELEPHONE CABLE TO ENTER TERMINAL ON LEFT SIDE
TELEPHONE CABLE TO ENTER TERMINAL ON RIGHT SIDE.
CONNECT TRACER CONDUCTOR TO RIGHT POST
WC-534 TELEPHONE CABLE
FOR CLARITY, DROP WIRES ARE NOT SHOWN.

Fig. 5—Method of attaching drop cable to pole and connecting cable in terminal.

STROM

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The Sturgis 635FF High Standard of tub steel, welded at all joints, won't wiggle squeak. Has genuine leather upholstery. adjustable seat heights:

18" to 22"	24" to 28"
20" to 24"	26" to 30"
22" to 26"	28" to 32"

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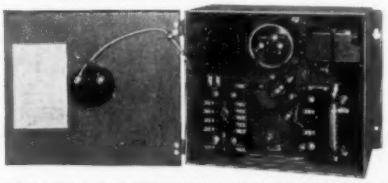

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*Reg. U.S. Pat. Off.

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(Left): Hemingray "No. 9." Made from only 9 oz. of glass, but with a maximum leakage path approaching standard long-distance design. Inner skirt surface well protected from rain-splash; long skirt protects pin itself.

(Right): Hemingray "No. 14." Its double-petticoat feature is useful wherever fog and humidity prevail. Production economy in design and lightness make its low cost attractive for rural telephone line budgets.

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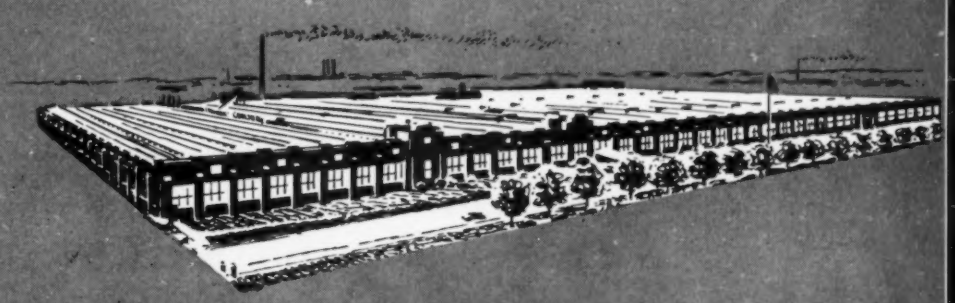

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conduit that may have been provided for telephone lines to enter the building. When such conduit is present, the drop cable should be attached as near as possible to the entrance head of the conduit, as indicated in *Figure* 8, to avoid placing a run on the building, if practicable.

If no entrance conduit is provided, the next best choice is a location where a direct *vertical* run can be made to the entrance into the building, as illustrated in *Figure* 9. Such a location should preferably be on the rear of the building.

To assure adequate support for the free span of drop cable at the building, only the sturdiest type of drop wire fixture should be used. A house bracket with "C" knob placed as illustrated in *Figures* 10 *and* 11 is considered sufficiently strong to support the maximum permitted length of drop cable span. Only one bracket and knob assembly should be used for each span of cable placed.

Another type of fixture that is satisfactory for masonry walls is a drive hook anchored by means of a ½" x 3" expansion shield. When it is desired to attach two spans of drop cable to masonry, a 3-hole open-eye iron strap fastened with bolts and expansion shields may be employed.

To attach runs of drop cable on various types of buildings, No. 2-R porcelain cleats should be used. These cleats are originally designed for supporting runs of No. 4 and larger power wires and is just right for the size of drop cable (9/16 inch diameter) utilized. On masonry or substantial brick veneer surfaces ⅝" bridle rings may be used in place of porcelain cleats between the first and last points of attachment.

For maximum holding strength, it is desirable to locate the house bracket so that the mounting screws will enter a stud in frame buildings. In the case of thin-wall brick or stone veneer, the mounting screws will not hold in the sheathing back of the brick or stone work. The attachment should then be made on the wood trim. If the trim is not sufficiently strong to hold the cable span, the bracket should be mounted on the eaves (*Figure* 11).

Methods of placing the attaching fixtures are illustrated in *Figure* 12. The proper types of attachments and mounting screws or bolts for various types of mounting surfaces are listed in *Table II*.

When bridle rings are used to support a long run of drop cable (50 feet or over), it is advisable to place a 2-R porcelain cleat in the center of the run to reduce sagging of the cable between rings. Turns in the run should be made smooth and gradual, to avoid undue strain on the neoprene jacket.

TABLE II—Mounting Screws or Fixtures for Types of Building Construction

Types of Building Construction	FIRST ATTACHMENT (PRIMARY) House Bracket with "S" Knob and 5/16" x 2" F. H. Galv. Stove Bolt	FIRST ATTACHMENT (SECONDARY) AND FINAL ATTACHMENT No. 2—R Porcelain Cleat	INTERMEDIATE ATTACHMENTS (Note 1)
Frame Construction (or on Substantial Wood Trim)	Three 2" x No. 14 R. H. Galv. wood screws	Two 2½" x No. 14 R. H. Galv. wood screws	2—R porcelain cleats
Brick Roll Siding or Stucco on Wood Sheathing (Note 2)	Three 2½" x No. 14 R. H. Galv. wood screws (Note 3)	Two 3" x No. 14 R. H. Galv. wood screws	2—R porcelain cleats
Composition Shingle Siding (Note 4)	Three 3" x No. 14 R. H. Galv. wood screws	Two 3½" x No. 14 R. H. Galv. wood screws	2—R porcelain cleats
Masonry or Substantial Brick Veneer (Note 5)	Three 1½" x No. 14 R. H. Galv. wood screws in No. 10-14 x 1½" lead screw anchors (Note 6)	Two 2½" x No. 14 R. H. Galv. wood screws in No. 10-14 x 1" lead screw anchors	2-R porcelain cleats or ⅝" bridle rings in No. 6-8 x ¾" lead screw anchors
Thin-Wall Brick or Stone Veneer (Note 7)	Three 6" x No. 14 R. H. Galv. wood screws through mortar joints (note 8)	Two 2½" x No. 14 R. H. Galv. wood screws in No. 10-14 x 1" lead screw anchors	2-R porcelain cleats or ⅝" bridle rings in No. 6-8 x ¾" lead screw anchors
Slab Veneer (Note 9)	Three 4½" x No. 14 R. H. Galv. wood screws through mortar joints (Note 8)	Two 2½" x No. 14 R. H. Galv. wood screws in No. 10-14 x 1" lead screw anchor	2—R porcelain cleats
Hollow Tile	Two ¼" x 4" R. H. toggle bolts (note 10)	Two ¼" x 4" R. H. toggle bolts	1¼" toggle bridle rings

NOTES:

1. Porcelain cleats use same mounting screws as specified under "First Attachment (Secondary)".
2. Drill clearance holes through stucco to prevent cracking or chipping the surface.
3. Use 3" screws, if attachment can be made to both sheating and studding.
4. Drill clearance holes with sharp bit stock drill.
5. Substantial brick veneer is 3¾" or thicker.
6. In **solid** masonry, drive hook and ½" x 3" lag expansion shield may be substituted for the house bracket and knob. A second cable grip may be used in place of the 2—R porcelain cleat to support the run at this point.
7. Thin wall brick or stone veneer construction uses veneering less than 3¾" thick, as shown by inspection at an outside corner. This class of construction also includes bricks that crack or loosen easily when drilled.
8. If practicable, locate the bracket so that all three mounting holes can be drilled through the mortar joints; otherwise drill two holes, one for the upper hole and the other for one of the two inner holes of the bracket.
9. Slab veneer is 1 inch thick.
10. Place one bolt in upper hole and other bolt in one of the two lower holes of the bracket.

Bringing The Drop Cable Into the Building

IN GENERAL, the location of the drop cable entrance follows the same rules applied to standard drop wire. The cable is brought into the building in one of the following ways:

(1) Through entrance conduit provided by the subsciber.

(2) Through the foundation sill.

(3) Through frame of basement windows (where the frame is of wood sufficiently thick to bore a 1" hole in it without weakening it.)

(4) *As a last resort*, through the foundation wall.

Only one hole should be drilled for each cable entering the building.

Where entrance is to be made into a frame building, drill a one-inch hole in the foundation sill at the proper point for the entrance. The hole should be slanted upwards slightly to prevent moisture from entering. The hole is then bushed with a 5/8"x 4" porcelain tube. No drip loop is required, if the hole slants upwards; otherwise the porcelain cleat should be placed to one side of the hole to

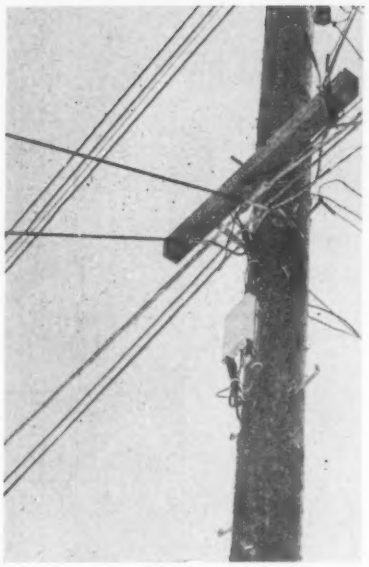

Fig. 6—Bringing two spans of drop cable into a cable terminal.

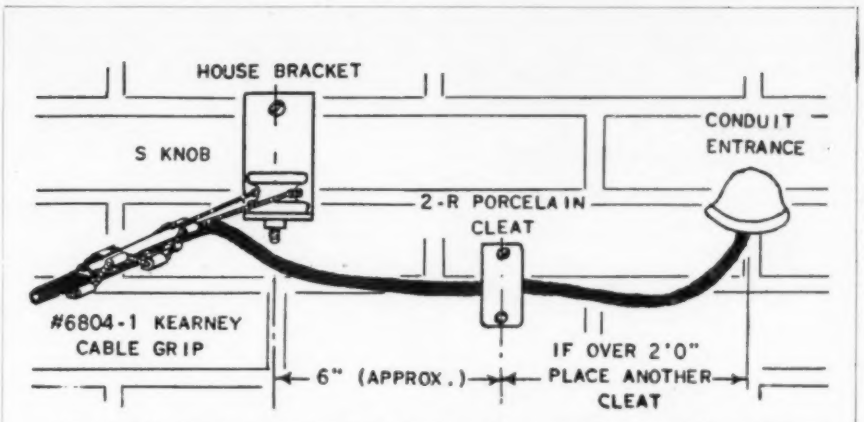

Fig. 8—Method of deadending drop cable span near conduit entrance.

enable a small drip loop to be formed (*Figure* 9.)

In brick and stone veneer buildings, a one-inch hole is drilled through a mortar joint intersection in line with the foundation sill. When the wood sill is reached, the hole is cleaned out and a one-inch auger bit is used to bore through the wood. The hole is then bushed from both ends with a 5/8" x 4" porcelain tube.

In the case of solid masonry buildings, the hole is drilled through a mortar joint intersection in the foundation wall. If a porcelain tube is to be used for good appearance, a one-inch hole shold be drilled; otherwise a 5/8-inch hole may be drilled, and friction tape wrapped around the drop cable to plug the hole.

Runs of drop cable on wood or other inflammable or conducting surfaces, or material inside the building, are made on 2-R porcelain cleats spaced 16 inches apart. At inside and outside corners on inflammable or conducting surfaces, 2-R porcelain cleats should be placed sufficiently close to the corner on each side to hold the cable away from contact with the surface. For masonry surfaces, ⅝ inch bridle rings, spaced 24-inches apart, may be used. The run should be dead ended on 2-R porcelain cleats near the entrance and at the protectors.

Terminating Drop Cable At Station Protectors

FIGURE 13 illustrates how neoprene drop cable is terminated at the substation protectors. The backboard shown is needed only when a satisfactory mounting surface cannot be otherwise obtained.

The stripping tool (*Figure* 7) is

(*Please turn to page* 60)

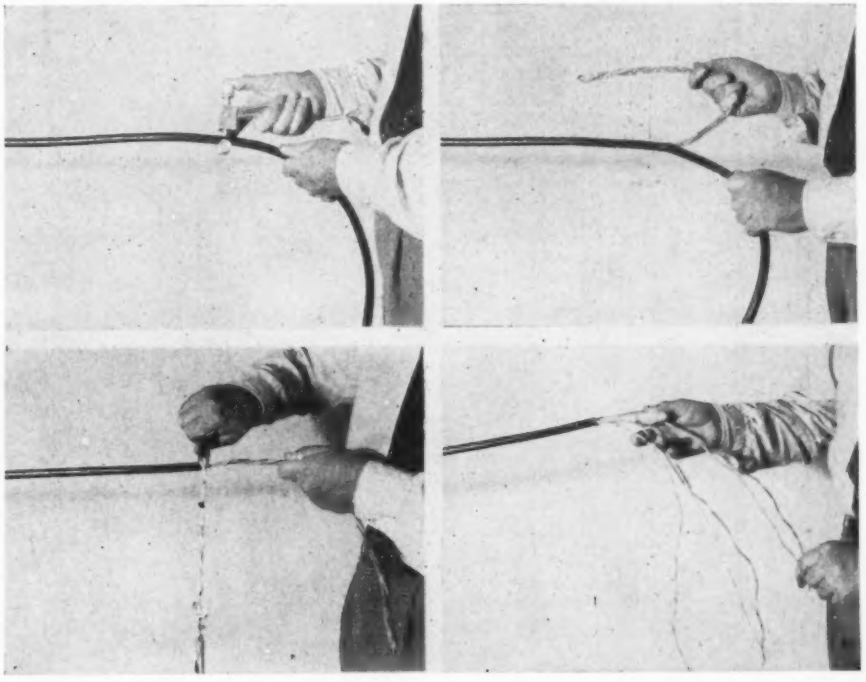

Fig. 7—Use of Toca Cable stripper to slit neoprene jacket on drop cable. Upper left—starting the slitting operation. Upper right—pulling the covering away from the cable. Lower left—trimming off the serving. Lower right—separating the pairs.

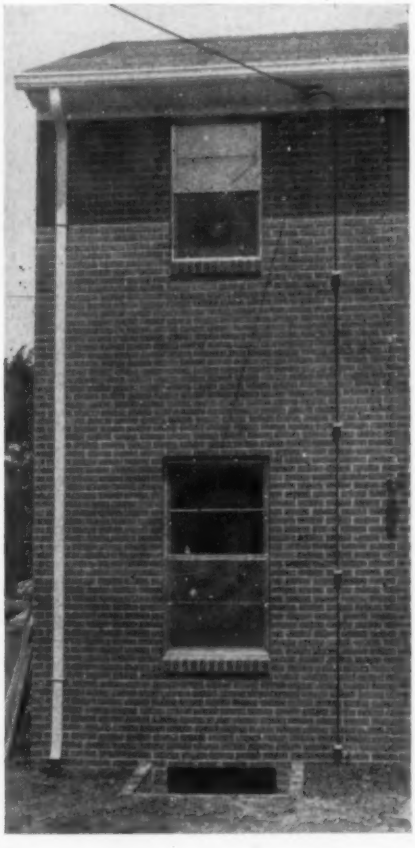

Fig. 9—Neat installation obtained by placing direct vertical run from attachment on eaves to entrance in foundation sill.

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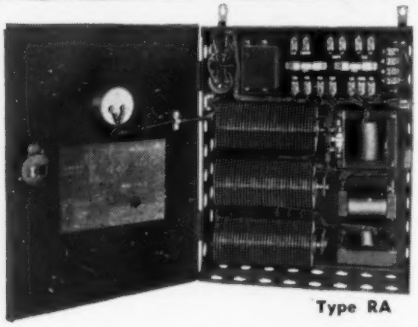

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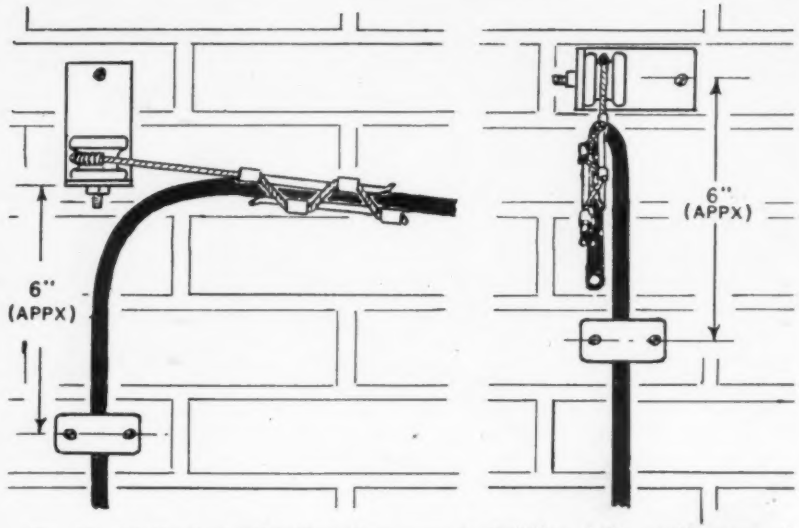

Fig. 10—Method of attaching drop span to building. Left—cable span at acute angle to building. Right—span at right angles to building. (Over 60 degrees from side of building.)

used to remove approximately 18 inches of the neoprene jacket. After trimming away the covering and inner wrappings the conductors are twisted to obtain a tighter lay. The conductors are then threaded through the insulated screw eyes, and the individual pairs are brought out to the protector terminals and connected thereon.

For an outside protector installation, the method of terminating the drop cable shown in Figure 14 may

(*Please turn to page* 61)

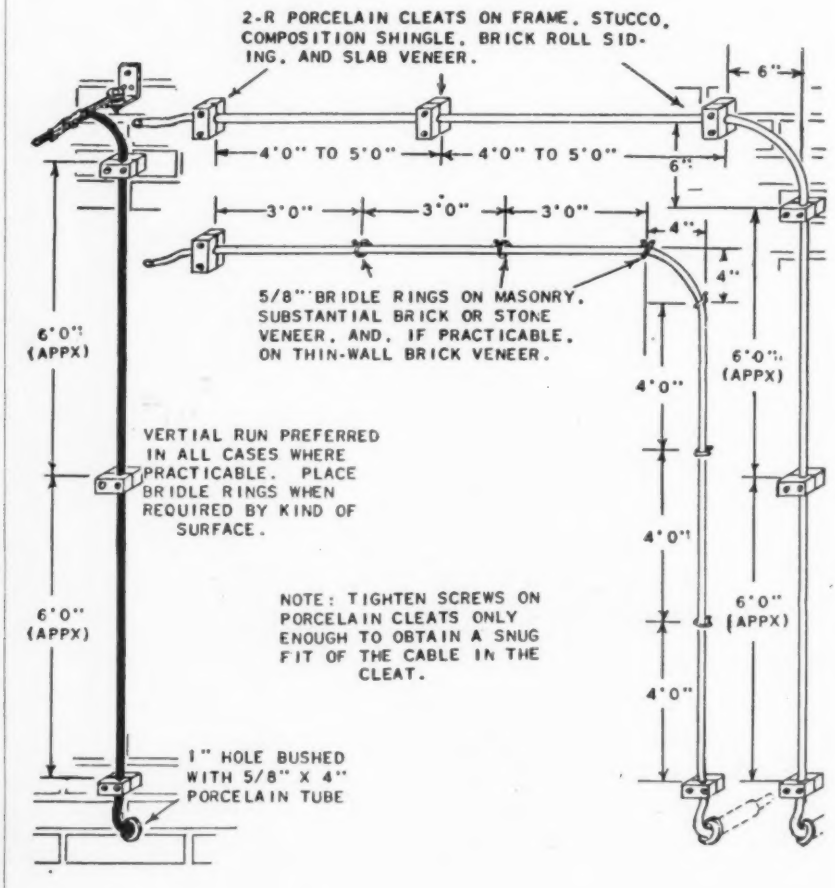
2-R PORCELAIN CLEATS ON FRAME, STUCCO, COMPOSITION SHINGLE, BRICK ROLL SIDING, AND SLAB VENEER.
6"
4'0" TO 5'0"
4'0" TO 5'0"
6"
3'0"
3'0"
3'0"
4"
4"
5/8" BRIDLE RINGS ON MASONRY, SUBSTANTIAL BRICK OR STONE VENEER, AND, IF PRACTICABLE, ON THIN-WALL BRICK VENEER.
6'0"
(APPX)
6'0"
(APPX)
4'0"
VERTIAL RUN PREFERRED IN ALL CASES WHERE PRACTICABLE. PLACE BRIDLE RINGS WHEN REQUIRED BY KIND OF SURFACE.
4'0"
NOTE: TIGHTEN SCREWS ON PORCELAIN CLEATS ONLY ENOUGH TO OBTAIN A SNUG FIT OF THE CABLE IN THE CLEAT.
6'0"
(APPX)
6'0"
(APPX)
4'0"
1" HOLE BUSHED WITH 5/8" X 4" PORCELAIN TUBE

Fig. 12—Methods of attaching neoprene drop cable to building wall.

Fig. 11—Close up of attachment of cable span to building eaves.

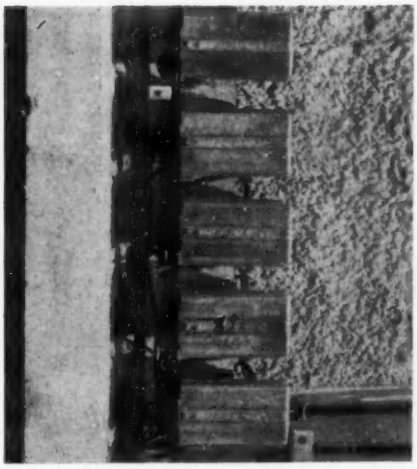

Fig. 14—Drop cable may be terminated at group of outside protectors

be used. The neoprene jacket at the end of the cable is not removed after slitting. Instead the conductors are brought out of the cable through the slitted covering and the slitted portion and the individual pairs are wrapped with friction tape. Each pair thus enters its protector at right angles to the cable.

Conclusion

AS MENTIONED in the introductory remarks, the neoprene-jacketed cable is a wartime development. This cable found considerable use in army telephone installations. It is understood that wire manufacturers are now improving this type of cable by adding metal tape to reinforce and further protect the inner conductors. This improvement should enable longer spans of the cable to be placed with smaller sags.

Another use for the neoprene-jacketed cable is to replace spans of drop wire brought to a common distributing pole, where the drops spread out to houses in an area. In this case the drop cable terminates in a 5-pair protector mounting (with protector

(Please turn to page 62)

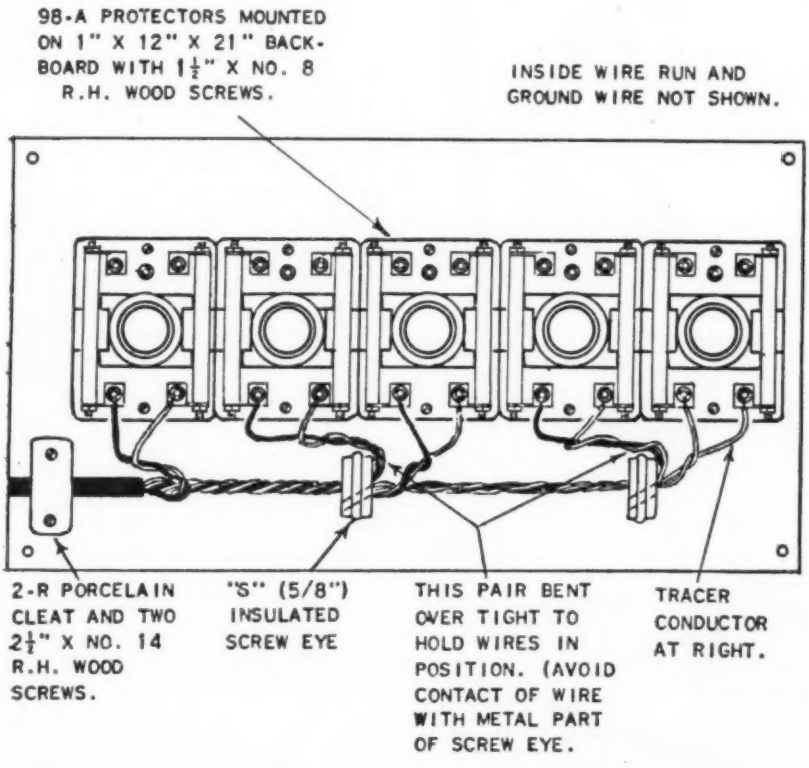
98-A PROTECTORS MOUNTED ON 1" X 12" X 21" BACK-BOARD WITH 1½" X NO. 8 R.H. WOOD SCREWS.
INSIDE WIRE RUN AND GROUND WIRE NOT SHOWN.
2-R PORCELAIN CLEAT AND TWO 2½" X NO. 14 R.H. WOOD SCREWS.
"S" (5/8") INSULATED SCREW EYE
THIS PAIR BENT OVER TIGHT TO HOLD WIRES IN POSITION. (AVOID CONTACT OF WIRE WITH METAL PART OF SCREW EYE.
TRACER CONDUCTOR AT RIGHT.

Fig. 13—Terminating drop cable at station protectors inside building.

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blocks removed and the mounting modified to accommodate the cable), and the individual drop wires feed out of the same housing.

It is suggested that the drop cable can also be employed on open wire lines in locations of excessive tree interference. In this case, the cable replaces the wires passing through the trees, protector mountings being used at the junctions of the cable conductors with the open wire conductors. This arrangement can be used only if the pole spacing is sufficiently short so that the cable spans do not sag excessively; otherwise ground clearance requirements may not be met.—THE END.

Cable Splicing

(Continued from page 30)

an excellent job; he is doing a modern job.

During the past 25 years I have talked to countless numbers of cable-splicers and quite a number of foremen. During these conversations I ask the questions and the cable-splicer does the talking. I feel that I can truthfully say that no other group of craftsmen are more seriously interested in their work than the cable-splicer. He is open minded and always anxious to improve his methods and experiment with new ideas.

The Wiping Cloth

SO IMPORTANT is the wiping cloth that it is common practice among plumbers to carry one or two of their choice wiping cloths in the hip pocket. So important is the wiping cloth that utilities that use them in large numbers have detailed blueprints and specifications to which the completed wiping cloth must conform in every detail. The smaller utilities that use wiping cloths in smaller quantities purchase them from a reliable wiping cloth manufacturer who makes wiping cloths a specialty.

There have been important improvements in finishing cloths, catch cloths, and the vertical wiping cloth. Inasmuch as a properly shaped wiped joint forms a curvature from the center of the joint to each edge, it has been an object for decades to produce a wiping cloth with the same curvature as the finished wiped

(Please turn to page 64)

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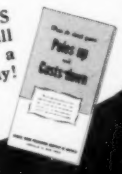

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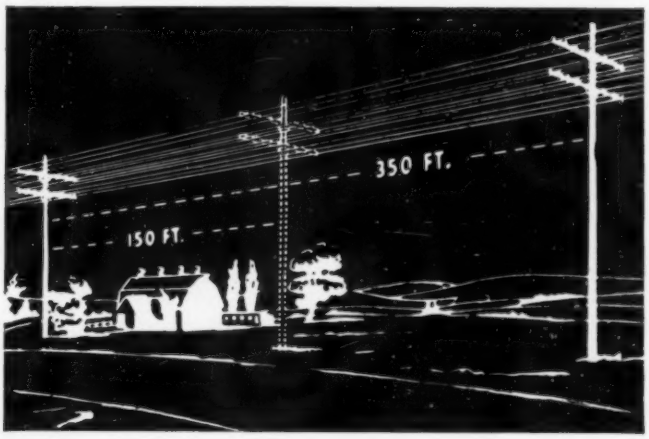

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joint. To accomplish such a wiping cloth many methods have been tried. Many have tried to produce the curvature by stiffening the material with glue between the folds. The cloth was formed into the desired curvature and dried. The curved wiping cloth was the result, but the cloth was stiff and not flexible and would not effect a smooth surface to the finished joint. Others tried a piece of curved sheet metal between the folds. This method produced a formed wiping cloth, but like the glued cloth it was stiff instead of flexible and would not produce a smoothly finished joint.

The formed wiping cloth of today is obtained by submitting the folded cloth to a pressure of 300 pounds in the presence of 500° of heat. The result is a perfectly curved wiping cloth with a uniform, and symetrical wiping surface. This type of formed wiping cloth is extremely flexible, and when drawn around the half molten setting solder in the wiping process hugs the solder at every point, thereby filling and smoothing the low spots and producing a well shaped smoothly finished wiping joint. In my opinion, no mechanical connection will never equal the wiped joint for joining lead sheathed cable and lead pipe.

There is no more important improvement in wiping cloths than the development and perfecting of the vertical wiping cloth for wiping cable-splices in a vertical position. The vertical wiping cloths are made in different thicknesses according to the size of cable. From a center opening which fits snugly to the cable it is split to the perifery or outer edge to permit the vertical cloth to be slipped over the cable and drawn into a funnel shape around the cable. See *Figure* 2.

The wiping surface of the vertical wiping cloth must be and is entirely free from stitches, seams, laps, folds, etc. If the wiping surface is not perfectly smooth, particles of the cooling solder will become embedded in and around the rough points, and in removing these particles the surface of the cloth would be ruined. The Signal Corps of the War Department had never heard of or used the vertical type of cloth until the last war during which time it used thousands of them.

Fig. 2—Wiping the vertical joint.

Lead Sheathed Cable

THE LEAD sheathed cable is distinctly an institution in itself. The first lead sheathed cable was produced in Sweden. Thomas A. Edison contributed much to its improvement. Many other individuals and groups have continually contributed to the perfecting of the lead sheathed cable until today it is unusually satisfactory.

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It wasn't the first time it had happened, and it seemed to Beran that the village should have better service. He had an idea of how it could be accomplished. In November 1947, he bought the telephone company, 24 subscribers, bag and baggage. This, in Beran's words, is what he got for his money:

"A dilapidated, depleted, antiquated manual switchboard that gave a headache to everyone that came near it.

"Twenty-four dissatisfied customers.

"Drop wire that broke when you looked at it.

"Run down poles and wire, all overhead.

"Twenty-four wall type phones.

"A service so poor that patrons could have done better by sticking their heads out of their windows and talking loud."

Beran bought the business with one thought in mind: to give Clements the best telephone service possible.

And, any thought that a desire to make money is hid behind that high-sounding public-service purpose quickly is dissipated by cold, hard figures from the financial statement.

Beran has spent, in addition to the purchase price, from $12,000 to $15,000 in modernizing the system.

Last month he had a net income from it of $38, out of which he had to pay insurance and maintenance.

Will he get back his money? "Perhaps," he says. "But it will take a long time."

That is not his main concern, however. He is satisfied that his improvement program is near completion and that a new dial system—as topnotch as any in a similar-size village anywhere—is in operation.

Since buying the business—it had been owned by a cooperative of which he was a member—Beran has added these improvements.

Installation of about 4,000 feet of underground cable, with terminals at several parts of the village. The cable replaces almost all of the wire and most of the poles of the old system.

Erection of a new 12 by 14 foot brick building to house the exchange.

Purchase of a new switchboard, automatic dial equipment and new telephones.

Beran expects from 40 to 45 subscribers in the village when the dial system gets into operation, and later he plans to build lines to about eight farm families.

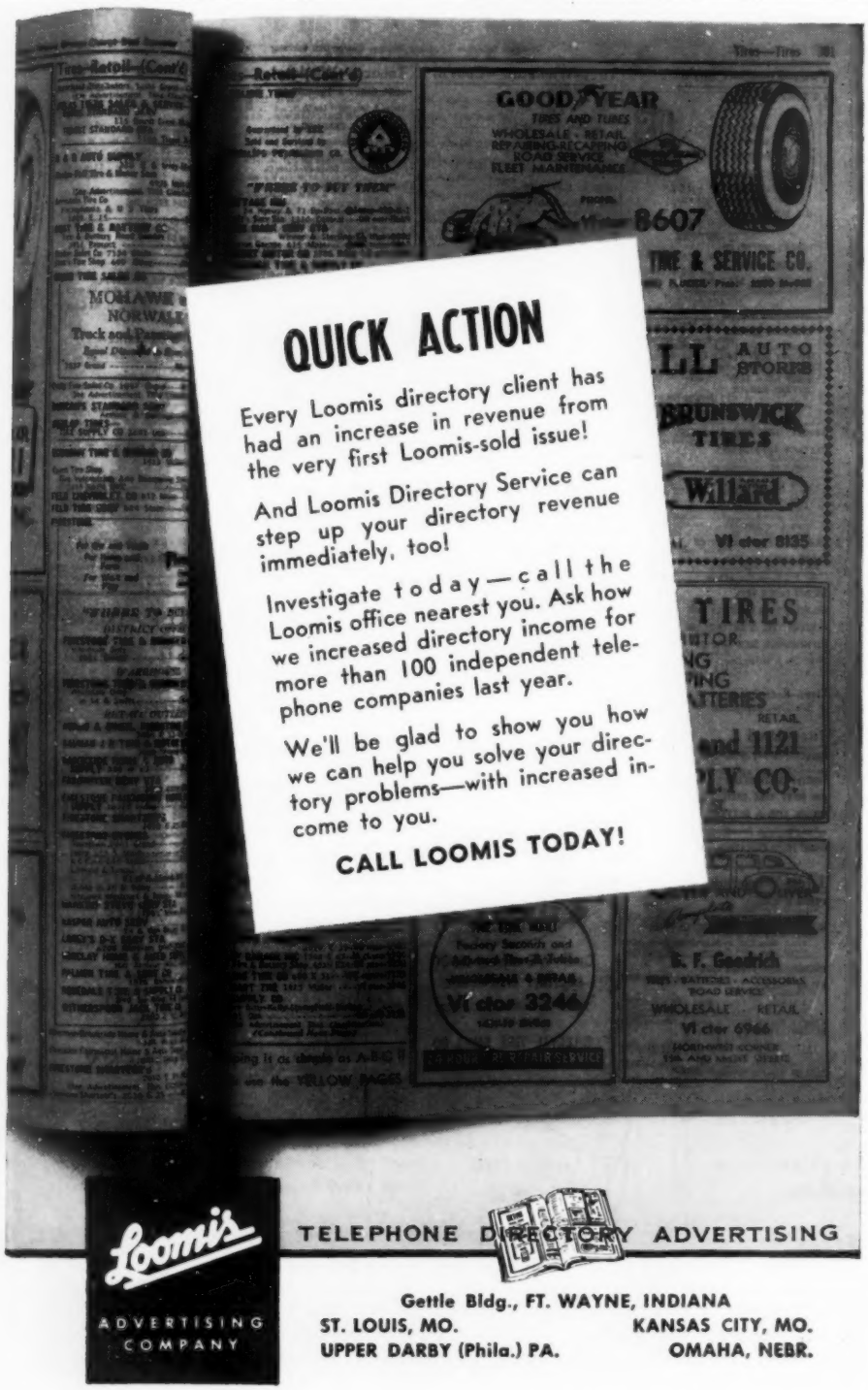
He will save the salary of an operator, necessary in the old system. Thus, the added subscribers and an expected rise in business because of the better service are what Beran expects will make the business economically sound.

Public service isn't anything new for him, and neither is anyone likely to question his sincerity.

He has lived on a 130 acre farm on the edge of Clements 29 years—specializing in raising, buying and trucking livestock—and during all those years has been township assessor. He made several unsuccessful bids for the state legislature, and after being defeated, thanked his supporters and in paid advertisements pledged to "find other ways to serve."

Softball became popular in Clements, and games were played Sunday

(*Please turn to page* 68)


GOODYEAR
TIRES AND TUBES
WHOLESALE - RETAIL
TIRE & SERVICE CO.
QUICK ACTION
Every Loomis directory client has had an increase in revenue from the very first Loomis-sold issue!
And Loomis Directory Service can step up your directory revenue immediately, too!
Investigate today—call the Loomis office nearest you. Ask how we increased directory income for more than 100 independent telephone companies last year.
We'll be glad to show you how we can help you solve your directory problems—with increased income to you.
CALL LOOMIS TODAY!
BRUNSWICK TIRES
Willard
TIRES
B. F. Goodrich
Vi ctor 3246
Loomis
ADVERTISING COMPANY
TELEPHONE DIRECTORY ADVERTISING
Gettle Bldg., FT. WAYNE, INDIANA
ST. LOUIS, MO.
KANSAS CITY, MO.
UPPER DARBY (Phila.) PA.
OMAHA, NEBR.

CUT your Costs by Using No.18 Copperweld® DROP WIRE

TRADE MARK

By using a smaller drop wire to do the work of a larger one—you can save money without sacrificing strength or safety. It's a fact! No. 18 Copperweld* Drop Wire has a breaking strength of 340 pounds for the pair. This is equivalent to the strength of No. 17 drop wire of other types. Many companies, including the world's leading telephone systems, have reduced their drop wire costs by standardizing on No. 18 Copperweld Drop Wire.

Start saving now by ordering No. 18 Copperweld Drop Wire. It is available in twisted pair and parallel constructions — in a wide variety of insulations and jackets.

COPPERWELD STEEL COMPANY, *Glassport, Pa.*

SALES OFFICES IN PRINCIPAL CITIES

*Trade Mark

Copperweld® NON-RUSTING Telephone Products

TRADE MARK

LINE WIRE • DROP WIRE • GROUND RODS AND CLAMPS • GUY AND MESSENGER STRAND
CABLE RINGS • CABLE SPINNING WIRE • NAILS AND STAPLES • GRIP-FLEX® INSULATOR TIES

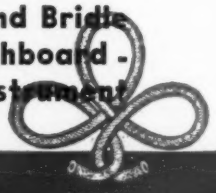
SOLD BY LEADING DISTRIBUTORS

ALPHADUCT WIRES
FOR All TELEPHONE REQUIREMENTS

LONG LIFE

Neoprene Jacketed
Drop and Bridle Wire

Weatherproof Braided Drop and Bridle
Interior - Tree - Ground - Switchboard -
Pothead - Cable Terminal - Instrument



Manufactured and Tested to Rigid Specifications
ALPHADUCT WIRE & CABLE CO.
Milltown, New Jersey Telephone: Milltown 8-0030

HOW TO CREATE JOB ENTHUSIASM

By CARL HEYEL
Lehn & Fink Products Corp.
248 pages, 5x8, illustrated, $2.25

Think what it would mean to your firm, your department, your plant, your office, if you could get more real zest on the part of your employees into their jobs—not once, not just tomorrow, but regularly day in and day out.

The book is arranged as a kind of "three-cornered conversation" among the book, the reader and the author. The main argument is carried on logically and impersonally by the book. However, this thread is broken time and again by the author, who offers examples and personal observations to point up the discussion. Whenever he "puts his oar in" in this way, the type is indented and set smaller face. This illustrative matter comprises a broad range of actual case examples.

The book presents five "flow charts" that give graphically bird's-eye views of the ideas developed. After the book has been read, examination of these flow charts in sequence will furnish an accurate review of the whole presentation.

Order from:
Telephone Engineer Pub. Corp.
7720 N. Sheridan Rd., Chicago 26, Ill.

That transmission line fact you want is here . . .

This book is a great manual of principles, data, methods, and cautions on all aspects of the lineman's work. Everything is covered, from the elements of electricity to maintenance of lines, and first aid work. The writing is clear, simple, and understandable.

THE LINEMAN'S HANDBOOK

By EDWIN KURTZ
Second edition, 652 pages, 6x9,
682 illustrations, $5.00

This book familiarizes you with every component of transmission lines—electrical fundamentals and electric circuits, the electric system from generation to distribution, even a chapter showing how transmission lines are designed. Descriptions of all the materials of line construction; poles, conductors, hardware, tools, electrical apparatus, etc., are also supplied. With this sort of background, every line of the chapters on construction, testing, and maintenance that follow are twice as valuable.

Order from:
Telephone Engineer Pub. Corp.
7720 N. Sheridan Rd., Chicago 26, Ill.

afternoons. Beran opposed playing ball on Sundays and said so. It seemed to be the only day the players were free from work.

Beran built a softball diamond on his farm and put up lights so that games could be played at night during the week.

It was with such a background that he was approached by members of the cooperative which owned the *Clements Telephone Company* two years ago.

During the war when equipment was next to impossible to obtain, the condition of the system slipped, and now seemed to be the time to overhaul it, members of the cooperative felt.

However, they believed one man, acting independently, could do the job better than an organization. Beran was the man, and they "talked him into it," he says.

Things didn't happen overnight to the 20 year old company. But Beran knew what he wanted, and meanwhile he patched and pieced-together to give as good temporary service as he could.

Last September with the aid of his son, Ted, who has been doing a lot of the "outside work," Beran launched his program by erecting the exchange building.

This move took the switchboard out of its rented space in a Clements' cafe.

Beran gauged his work with a long glance into the future.

"Underground cables cost more now, but I believe they'll prove cheaper in the long run, and they are a guarantee of better service," he said.

All this was accomplished by a man who had no previous experience with telephone work, and one who was discouraged at every corner when seeking advice on whether to purchase the business.

"I talked to all the telephone people I could think of," Beran related. All of them indicated that a system in a community of Clements' size could not pay out."

Beran didn't argue with them, but he persisted in his belief that good telephone service is a necessity and that "you need to have someone to do those things, otherwise they wouldn't be done."

He said that owning the company "is just like going to school every day."

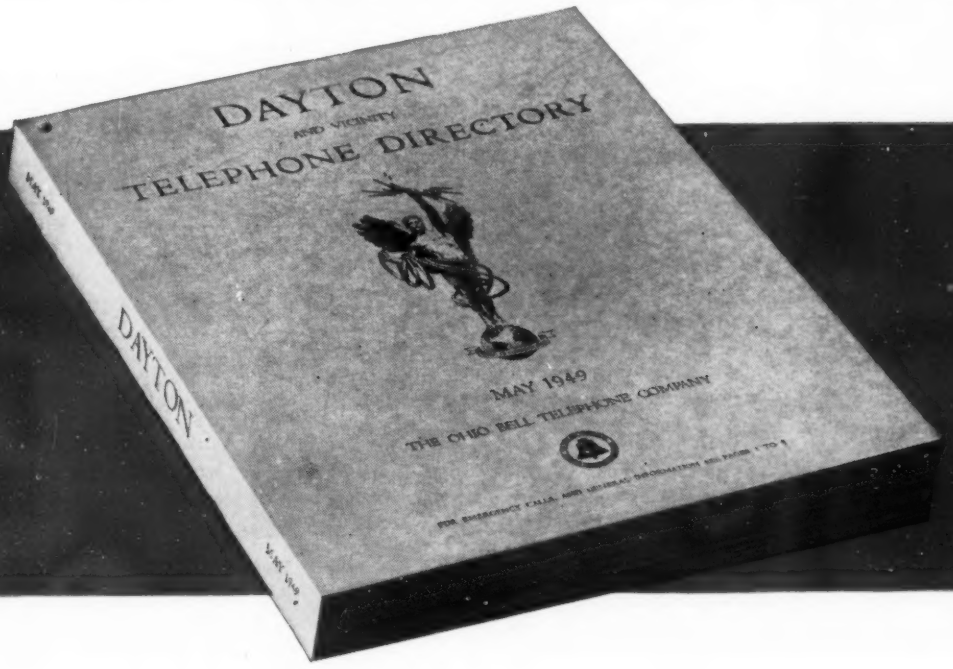
Clements residents, he reported, have been "very cooperative and patient" since he bought the firm, but

(*Please turn to page* 70)

One of 790 "BEST SELLERS"

by

L. M. BERRY & COMPANY



1. **PLANNING**—Each **BERRY** sales canvass is carefully planned before a single call is made. Prospects are listed on cards and assigned to salesmen by areas. No sale is overlooked.

3. **COMPILING**—**BERRY** compilation units are the last word in accuracy as they draw up ad schedules, check alphabetical and classified manuscripts, etc.

Better planning and selling of "Yellow Pages" advertising for more than 130 Telephone Companies combine to make directories by BERRY "Best Sellers". That's why so many Independent and Bell Telephone Companies have adopted BERRY service. They like the maximum operating revenues produced by experienced selling (even in today's tougher markets). And they like the way BERRY salesmen maintain sound and friendly customer relations. For complete directory service, call on L. M. Berry & Company—established since 1910.

L.M. BERRY & CO.

Directory Advertising Exclusively

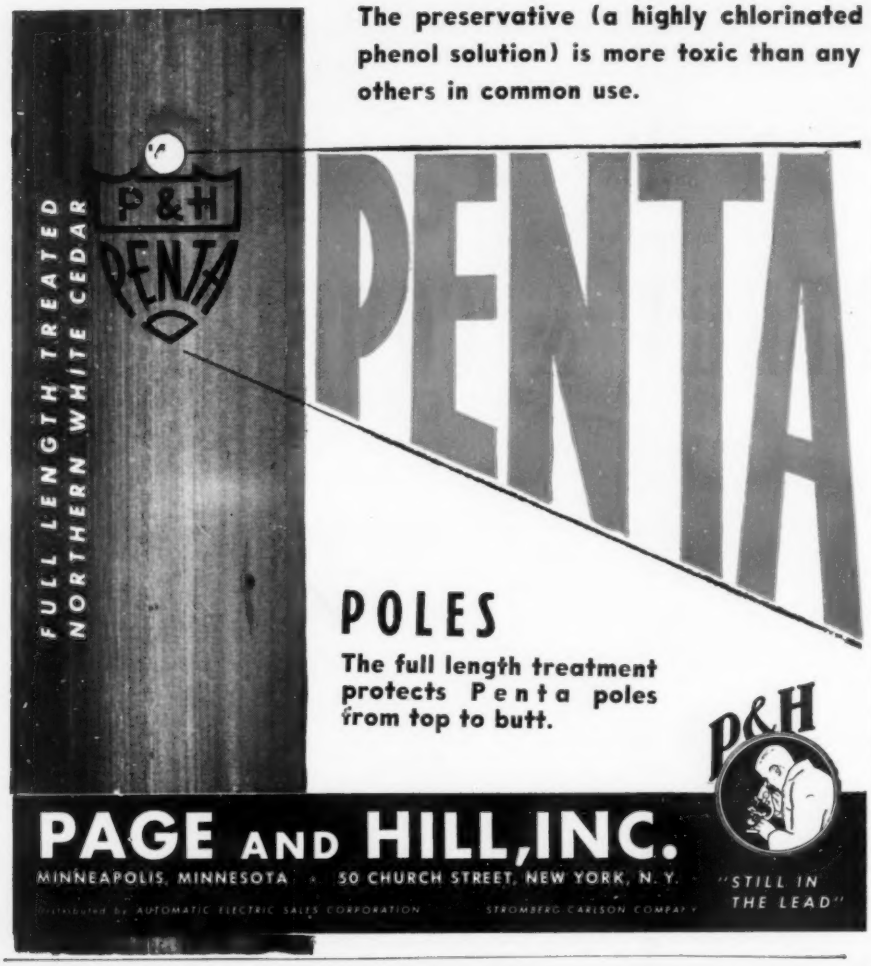
2. **SELLING**—Well-trained and supervised **BERRY** salesmen plan each call in advance . . . present layouts and copy . . . show all prospects the benefits of directory advertising.

4. **PRODUCING**—Skilled **BERRY** production men follow through on artwork, cuts and type . . . can arrange for complete printing and binding of directories.

L. M. BERRY & COMPANY • **Hulman Building** • **Dayton 2, Ohio** • **Michigan 7421** • **L. D. Loop 16**

13 BRANCH OFFICES: Birmingham, *Alabama* • Bristol, Chattanooga, Memphis and Nashville, *Tennessee* • Harrisburg, *Pennsylvania* • Jackson, *Mississippi* • Louisville, *Kentucky* • Milwaukee, *Wisconsin* • New Orleans, *Louisiana* • Rochester, *New York* • Tampa, *Florida* • Warsaw, *Indiana*

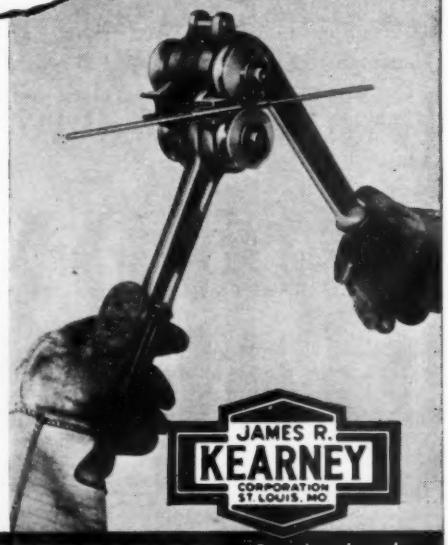
BERRY REPRESENTATIVES SELL ADVERTISING FOR MORE TELEPHONE DIRECTORIES THAN ANY OTHER COMPANY



The preservative (a highly chlorinated phenol solution) is more toxic than any others in common use.

Speed Up Construction and Repair

Eliminate High Resistance Joints by Using Kearney Splicing Machines and Sleeves



By the application of a tremendous pressure, uniformly applied over the entire length of the splicing sleeve, Kearney Splicing Machines provide a splice that exceeds the breaking strength of the conductor.

The job is done quickly and neatly with these well balanced, easy-to-use splicing machines. They are made to extremely close tolerances, from highest quality materials to assure long life. For the best possible job always use Kearney Sleeves with Kearney Splicing Machines.

See your jobber or write to

JAMES R. KEARNEY CORPORATION
4236 CLAYTON AVE. • ST. LOUIS 10, MO.

Overhead and Underground Utility Equipment

it appears now that their patience no longer is needed.

For the start of operation of the new system—which will be complete with newly printed telephone books as soon as Beran can have them done—Beran said Clements users service that will be hard to match anywhere.

That, in itself, will make the venture worthwhile for Beran.

And, who knows? Perhaps that $38 will grow. . . .

W. J. Holladay Joins Alabama Telephone Co.

James N. Cox, Sr., president of the Alabama Telephone Co., has announced the appointment of W. J. Holladay, of Cookeville, Tenn., as general superintendent and purchasing agent of the Alabama Telephone Co., with headquarters in Fayette. Mr. Holladay will have charge of all matters pertaining to the operation and promotion of the company previously handled by Jas. N. Cox, Jr., who is taking a leave of absence on account of his health and general condition.

Mr. Holladay has had 42 years of service in the telephone field, with the Southern Continental and its predecessor, the Gainesboro Telephone Co., in varied capacities, and at the time of his retirement and acceptance of employment in the above capacity, was district manager of the Southern Continental Telephone Co., Cookeville, Tenn.

Mr. Holladay is a member of the U. S. Independent Telephone Pioneer Association, the Telephone Pioneers of America and the Tennessee Indapendent Pioneers.

Automatic System Planned For Campbell, Mo.

Southeast Missouri Telephone Co. has announced that outside work on a new automatic telephone system at Campbell, Mo., was started July 15 and will be completed sometime in the Fall at a cost of $55,000.

The automatic system will be housed in the new brick, telephone building in Campbell.

Charles W. Boutin, president of the company has previously announced that a new $100,000 telephone exchange will be built in Kennett and a new dial system installed by 1950.

R. L. KOEHLER, who has resigned as director of sales of The Four Wheel Drive Auto Co., Clintonville, Wis., to join in operation of The Four Wheel Drive Pacific Co., distributor of FWD trucks, congratulates M. O. Stockland, Jr., on his appointment to the helm of the FWD sales organization.

Modernization Project Started at Winnett, Mont.

A crew has started work at Winnett, Mont., on an extensive modernization and maintenance program of the Burt Sisters Telephone Exchange, operating at Winnett and Grass Range.

Major improvement will be the changing over from grounded to the metallic system. "This will eliminate interference from electric transmission lines." Miss Matty Burt, Winnett manager, said.

New poles are being set where needed as well as replacing of crossarms and other line maintenance work is being done. The project is expected to be completed the latter part of August.

Jaques Digger To Be Manufactured In Wilkes-Barre

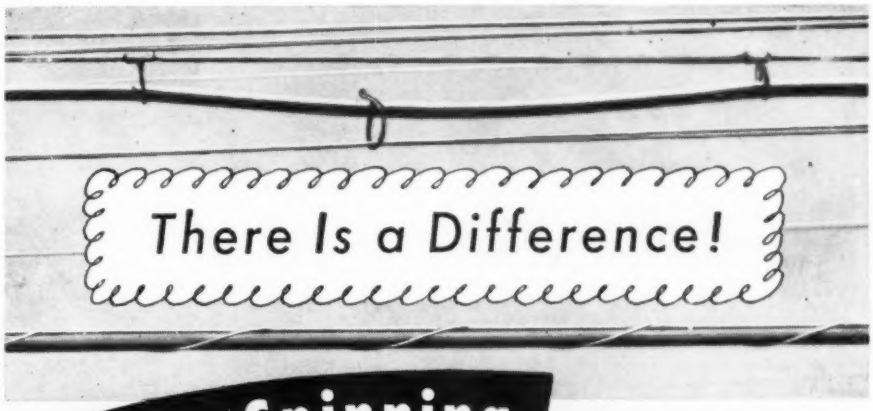
W. G. Arnold, executive vice president of the Wyoming Valley Equipment Co., Inc., Forty Fort, Pa., has announced that manufacturing rights of the Jaques Hydraulically Controlled Earth Boring Machine, formerly produced by the Jaques Co., Denison, Texas, have been purchased by the Johnson Engineering & Manufacturing Co., Wilkes Barre, Pa.

The Jaques Earth Boring Machine, with various type mountings adapted for trucks or tractors, already are in wide use throughout the country for digging telephone and power-line holes, foundation holes and guard-rail holes. The Jaques Digger has been and will continue to be distributed by the Wyoming Valley Equipment Co., whose distribution includes 22 states and the District of Columbia and all foreign countries excepting Mexico and Australia.

According to the manufacturers, the hydraulically controlled Jaques Earth Borer, mounted on truck or tractor, drills holes easily, quickly and economically at any angle from the vertical position and from either side of the truck or tractor. Specially designed hydraulic controls permit instant leveling and plumbing regardless of the position of the truck on which it is mounted. The diggers are equipped with 110 HP Ford V-8 motors. Boring augers, designed for clay, shale or rock, drill and ream out a hole faster, better and cheaper.

Distribution and complete service facilities will be handled by the Wyoming Valley Equipment Co. which is also setting up distributors and service facilities in all the large centers of their 22 state distribution area.

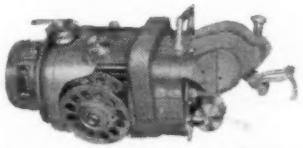
A special Canadian sales and service agency will be established in Toronto to handle Canadian customers and exports to all countries of the British Empire.



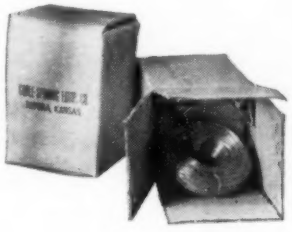
Cable Spinning Protects Your Outside Plant

You can **see** the difference! Records of independent telephone companies from coast to coast ***prove*** the difference—spun cable protects your plant investments . . . reduces maintenance costs as much as ⅔!

That's why more and more telephone companies everywhere are specifying spun cable for new construction and line maintenance.



Cut Maintenance time, speed new lines—equip your crews with Neale Model D Cable Spinner.

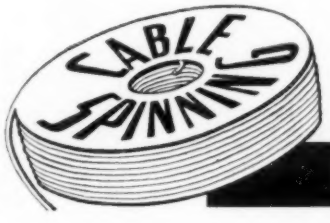


You, too, will find cable spinning lengthens plant life . . . lowers maintenance costs . . . cuts line outages.

Cable spinning is fast, economical, practical when your crews are equipped with Cable Spinning Equipment Company tools designed especially for the job. There's a complete line to choose from.

For BEST RESULTS use NEALE WIRE! Available in 7 different types, Neale Spinning Wire meets the toughest construction and corrosion problems.

WRITE OR PHONE your jobber today for complete information on how Cable Spinning Equipment Company tools can protect your plant investment.



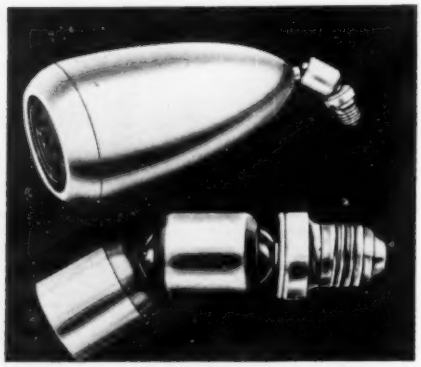
EQUIPMENT CO.

TOPEKA, KANSAS Phone 3-1829

ADDITIONAL Information on New Products or Service and Supplies of any Advertiser listed in this section may be promptly obtained by filling out the handy request for more information reproduced on the opposite page. All items are numbered. Check number of items on which more information is desired and send to Telephone Engineer Publications. Kindly mention Telephone Engineer Publications when contacting advertiser direct.

the New Products Showcase

New Products & Supplies of Practical Interest



New type swivel socket screws into any fixed ceiling socket to make it universally adjustable in any direction and in a wider range than has heretofore been possible with conventional swivels. Double universal ball joints inside the socket provide unusual flexibility in a 360° horizontal and 180° vertical range.—Check New Product 154.

ADVERTISING, Directories—General Telephone Directory Co., 604 Pine Ave., Long Beach, Cal., and 185 N. Wabash, Chicago, Ill.—[ADV. 4]

ADVERTISING, Selling—Telephone Directories—L. M. Berry & Co., Hulman Bldg., Dayton, Ohio.—[ADV. 5]

ANCHORS, Albion Malleable Iron Company, Albion, Mich.—[ADV. 6]

ANCHORS—James R. Kearney Corp., 4224 Clayton Ave., St. Louis, Mo.—[ADV. 7]

BATTERIES, Dry Cell—National Carbon Co., Inc., 30 E. 42nd Street, New York 17, N. Y.—[ADV. 8]

BATTERIES, Dry Cell—The Ray-O-Vac Company, 2317 Winnebago St., Madison, Wisc.—[ADV. 9]

BATTERY—WATER UNITS (Demineralizers For Tap Water—A. E. Tomkin & Co., 18 8 Columbia Rd. N.W., Washington 9, D. C.—[ADV. 10]

BELTS — CLIMBERS — COMPLETE LINEMENS' EQUIPMENT, W. H. Bashlin Co., Bashlin Bldg., Grove City 1, Pa.—[ADV. 11]

BELTS—CLIMBERS—Miller Equipment Co., Inc., Franklin, Pa.—[ADV. 12]

BOOTHS—Acoustic Telephone—Sherron Metallic Corp., 1201 Flushing Ave., Brooklyn 6, N. Y.—[ADV. 13]

BOOTHS—Churchill Cabinet Co., 2119 Churchill St., Chicago 47, Ill.—[ADV. 14]

CABLE, All Plastic, Aerial, Duct, Direct Burial, PBX, Switchboard.—The Ansonia Electrical Co., Ansonia, Conn.—[ADV. 15]

CABLE SPINNING—The Cable Spinning Equipment Company, 432 Crane St., Topeka, Kans.—[ADV. 16]

CABLE TERMINALS—Channell Splicing Machine, 2415 Roanoke Rd., San Marino, Calif.—[ADV. 17]

CORDS, Instrument and Operators—Commermercial Cord & Supply Co., 26 Main St., Clifton Springs, N. Y.—[ADV. 18]

CORDS, Switchboard & Telephone—Runzel Cord & Wire Co., 4727-31 Montrose Ave., Chicago 41, Ill.—[ADV. 19]

ENGINEERING, Construction—Neale Construction Company, 432 Crane St., Topeka, Kans.—[ADV. 20]

FIRE POTS, FURNACES, Etc.—Clayton & Lambert Mfg. Co., 1701 Dixie Highway, Louisville 10, Ky.—[ADV. 21]

FIRE POTS, FURNACES, Etc.—The Turner Brass Company, 823 Park Ave., Sycamore, Ill.—[ADV. 22]

FURNACES—For quickly and economically melting lead and parafine—Mutual Liquid Gas Equipment Co., Inc., 3600 W. Imperial Highway, Los Angeles, Calif.—[ADV. 23]

GAS-TITE CABLE TERMINALS—Sub station protectors, main dist. frames; central office protectors; interior junction boxes; lightning arrestors.—Cook Electric Co., 2700 Southport Ave., Chicago 14, Ill.—[ADV. 24]

INSULATORS, Porcelain—Porcelain Products, Inc., Box 300, Findlay, Ohio.—[ADV. 25]

LIGHTWEIGHT PULLERS—Coffing Hoist Company, 800 Walters St., Danville 5, Ill.—[ADV. 26]

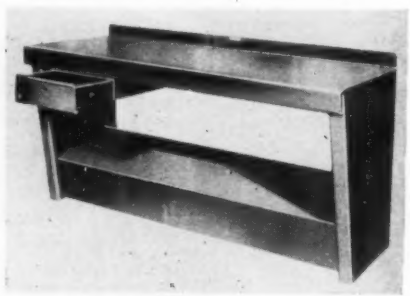
MAILING SERVICE FOR MANUFACTURERS—We will address and mail your direct-mail sales pieces to every telephone company in the United States. Telephone Engineer Publishing Corp., 7720 Sheridan Road, Chicago 26, Ill.

"PHONE EASE"—Holds phone in position for carrying on conversation and frees hands. Telephone Engineer Publishing Corp., 7720 Sheridan Road, Chicago 26, Ill.

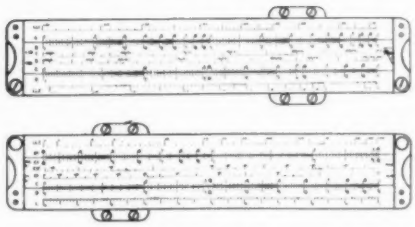
PIPE PUSHERS—Giant Manufacturing Co., South 6th St. at 12th Ave., Council Bluffs, Iowa.—[ADV. 27]

PIPE PUSHERS—Greenlee Tool Co., 2136 12th St., Rockford, Ill.—[ADV. 28]

POLES, Southern Yellow Pine—Colfax Lumber & Creosoting Co., Inc., Colfax, La.—[ADV. 29]



New style, high efficiency, work bench is made for the heaviest industrial uses with a 12-gauge steel top. Bench is 6' long, 34" high, and 28" deep. The legs are sloped back so that there is no stumbling; electrical knockouts for double outlets are provided in the front of each leg just below the top; back rails keep items from rolling off the top or shelf of bench; drawer is pilferproof.—Check New Product 155.



New, 6-inch Duplex Type All-Metal Log Log slide rule, bearing the regular 10-inch Log Log scale arrangement. This new rule incorporates the following 16-scale arrangement: Front: LL1, A-B, T, S, C-D, LL2. Back: LL3, DF-CF, CIF, CI, C-D, L.—Check New Product 156.

POLES, So. Yellow Pine—Koppers Company, Inc., Wood Preserving Div., 700 Koppers Bldg., Pittsburgh 19, Pa.—[ADV. 30]

POLES, Northern White Cedar—Page & Hill Co., 1017 Plymouth Bldg., Minneapolis, Minn.—[ADV. 31]

POLES, Southern Yellow Pine—Taylor-Colquitt Company, 290 E. Main St., Spartanburg, S. C.—[ADV. 32]

POLES, Southern Yellow Pine—Texas Creosoting Co., Orange, Texas.—[ADV. 33]

POLE HOLE DIGGERS—For derrick mounted trucks. Tel-E-Lect Products, Inc., 9613 Minnetonka Blvd., Minneapolis 16, Minn.—[ADV. 34]

POLES, Contract Inspection & Preservative Ground Line Treatment—Osmose Wood Preserving Co., 1443 Bailey Ave., Buffalo 12, N. Y.—[ADV. 35]

PRESERVATIVES, Wood—Barrett Div., Allied Chemical & Dye Corp., 40 Rector St., New York.—[ADV. 36]

PRESERVATIVES, Wood—Koppers Co., Inc., Wood Preserving Div., 700 Koppers Bldg., Pittsburgh 19, Pa.—[ADV. 37]

PROTECTIVE EQUIPMENT—Reliable Electric Company, 3145 Carroll Avenue, Chicago 12, Ill.—[ADV. 38]

RATCHET LEVER HOISTS—Coffing Hoist Co., 800 Walters St., Danville 5, Ill.—[ADV. 39]

REBUILT TELEPHONE EQUIPMENT—USED EQUIPMENT BOUGHT AND SOLD—Independent Telephone Repair Co., 1432 W. 15th St., Chicago 8, Ill.—[ADV. 40]

REBUILT TELEPHONE & SWITCHBOARDS—Telephone Repair & Supply Company, 1760 Lunt Avenue, Chicago 2, Ill.—[ADV. 41]

RECTIFIERS—Raytheon Manufacturing Co., Commercial Products Division, Waltham 54, Mass.—[ADV. 42]

RINGING MACHINES—Holtzer-Cabot Electric Co., 125 Amory St., Boston 19, Mass.—[ADV. 43]

SOLDERING IRONS, Electric—Vulcan Electric Company, Danvers 17, Mass.—[ADV 44]

SWITCHBOARDS, TELEPHONES, Etc.—Automatic Electric Company, 1033 Van Buren St., Chicago 7, Ill.—[ADV. 45]

SWITCHBOARDS, TELEPHONES, Etc.—Kellogg Switchboard & Supply Company, 6650 Cicero, Chicago 38, Ill.—[ADV. 46]

SWITCHBOARDS, TELEPHONES, Etc.—Leich Sales Corp., 427 W. Randolph St., Chicago, Ill.—[ADV. 47]

and BUYERS' DIRECTORY

Manufacturers and Suppliers Serving the $8,000,000,000 Telephone Industry

SWITCHBOARDS, TELEPHONES, Etc.—The North Electric Manufacturing Company, Galion, Ohio.—[ADV. 48]

SWITCHBOARDS, TELEPHONES, Etc.—Stromberg-Carlson Company, 100 Carlson Road, Rochester, N. Y.—[ADV. 49]

TIME RECORDERS—Calculagraph Co., 306 Co., 306 Sussex St., Harrison, N. J.—[ADV. 50]

TREE EXPERTS—Davey Tree Expert Co., Kent, Ohio.—[ADV. 51]

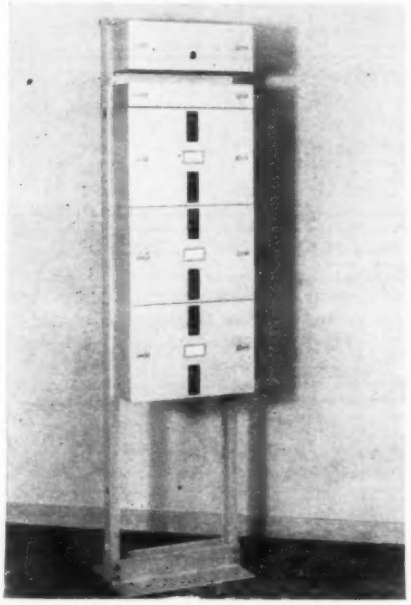
TREE TRIMMERS—Seymour Smith & Son, Inc., Oakville, Conn.—[ADV. 52]

TRUCK BODIES—Artisan Products, Inc., 3540 West 140th St., Cleveland 11, Ohio—[ADV 53]

TRUCK BODIES—Highway Trailer Co., Edgerton, Wisc.—[ADV. 54]

TRUCK BODIES AND EQUIPMENT—McCabe Powers Auto Body Co., 5900 N. Broadway, St. Louis 15, Mo.—[ADV. 55]

WIRE, Insulated Drop, Genuine Ironite—Paragon Electric Co., Two Rivers, Wis.—[ADV. 56]



Low cost equipment of flexible unitized design comprises the new Lenkurt Type 33B Carrier System which provides up to seven talking circuits with associated ringdown or dial-signaling channels from a two-way radio link. Spectrum utilized is 0 to 35 kc. Because equipment is designed on a channel-unit basis, it is feasible to assemble systems with fewer channels for later stacking of additional circuits without cost penalty per channel. Inter-channel crosstalk interference is practically eliminated by the use of identical transmitting and receiving frequencies for each channel.—Check New Product 157.

McCabe-Powers 90" Series 400 body mounted on a Dodge Power Wagon having a C.A. dimension of 52". This particular unit is especially well suited for rural or off-the-road operations.—Check New Product 158.

WIRE, Insulated—DATED DROP WIRE—Neo-Prene or Weatherproof—Alphaduct Wire & Cable Co., Milltown, N. J.—[ADV. 57]

WIRE, Insulated Drop and Bronze—Acorn Insulated Wire Co., Inc., 36 Freeman St., Pawtucket, R. I.—[ADV. 58]

WIRE, Drop Wire (Iron, Bronze & Copperweld)—General Insulated Wire Co., Providence, R. I.—[ADV. 59]

WIRE, Insulated Drop, HT Bronze, Paraprene or Braid Insulation—Paragon Electric Co., Two Rivers, Wis.—[ADV. 60]

WIRE, TELEPHONE, for all inside and outside uses—The Whitney Blake Co., Box K, Hamden, Conn.—[ADV. 61]

WIRE CUTTERS—H. K. Porter, Inc., 74 Foley, Somerville, Mass.—[ADV. 62]

SEND IN THIS COUPON FOR MORE INFORMATION

Telephone Engineer Publishing Corp.
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Please forward complete information on the following products and services described in the August, 1949 issue of TELEPHONE ENGINEER AND MANAGEMENT. (Check information desired.)

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NP 154..... NP 155..... NP 156..... NP 157..... NP 158.....

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WANTED TO BUY: Outright or substantial interest, small company or exchange, New England, New Jersey or eastern New York, Pennsylvania or Maryland. Write Box M, 707 Hill Road, Winnetka, Ill.

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FOR SALE: Several rows factory rebuilt drops and jacks for #105 Stromberg Carlson magneto switchboard. Price $15.00 per row of 5. Write H. H. Harris, Box 477, Yale, Oklahoma.

FOR SALE: Exchange in eastern South Dakota. Good condition. $17,000 annual income. Priced for quick sale. Have other business interest. Write for full information. Box No. 8635 c/o Telephone Engineer.

FOR SALE—125-station exchange, good toll revenue, room for expansion. 6-room house and office, near grade and high school. Write Ninnekah Telephone Company, Box 126, Ninnekah, Oklahoma.

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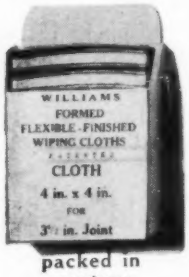

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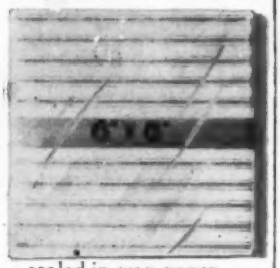
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FOR SALE—184-station magneto exchange. Subscriber waiting list. Gross over $6,000. Plant and lines in A-1 condition. Five-room home with office, extra lot, 2-car garage, service car and equipment. Located 90 miles north of Minneapolis. $13,000 terms. Finlayson Telephone Company, Box 76, Finlayson, Minn.

FOR SALE—420-station magneto exchange in northern Wisconsin. Gross $10,000 with good Bell contract. New 200-drop switchboard—not installed. Owner forced to sell because of ill-health. Cash price $14,000, write Badger Telephone Co., Box 292, Webster, Wis.

Positions Wanted

POSITION WANTED: Outside plant man experienced; nine years with large company; served as lineman, installer, repairman and maintenance man; presently located in Minnesota; wants to locate in Mountain States. Write Box No. 8636 c/o Telephone Engineer.

POSITIONS WANTED — Veteran of World War II, 36 years of age, with two years' experience on magneto systems as trouble-shooter, telephone and switchboard repairman and local manager, would like chance to learn common battery and automatic telephony. Wife has had 15 years' experience as switchboard operator and is capable of keeping records. Will consider good position on a magneto system if suitable. Address Kenneth E. Johnson, Savonburg, Kansas.

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REEL: Of Sturdy Steel construction containing ½ mile continuous length (2,640 feet) Weight (full) 160 lbs.

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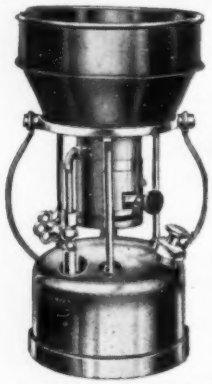

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221 W. Walton St., Chicago 10, Ill.

Automatic System Placed For Garden City, Minn.

The Mankato (Minn.) Citizens Telephone company has received authority from the Minnesota Railroad & Warehouse Commission to install a dial operated telephone exchange in Garden City.

The installation of the dial exchange at Garden City will enable the telephone company to develop the rural districts adjacent to Garden City which heretofore have not had telephone service, and also provide modern service to present subscribers in Garden City now being served from multi-party lines from Mankato exchange. The management of the telephone company estimates the cost of the new exchange will be approximately $30,000.

Makes Improvements At Dalhart, Texas

A. N. Line of the Southwestern Associated Telephone Co., recently announced extensive improvements affecting Dalhart, Texas, and nearby towns.

The company recently cutover the Stratford exchange to automatic operation and transferred toll and information service to the Dalhart switchboard.

Three positions were added to the Dalhart switchboard to speed up local service. Additional toll facilities were installed to Stratford, Texhoma and Guymon, Line said. He added that the Southwestern Bell Telephone Co., of Amarillo put in more toll circuits between Dalhart and Amarillo.

New Canadian Operation For Lenkurt Electric Co.

Lenkurt Electric Co., San Carlos, Calif., manufacturer of carrier equipment for wire-line and radio-link communication, electrical wave filters and toroidal coils, has announced the incorporation of a Canadian subsidiary company with its plant located at 926 Hastings St., Vancouver, B. C. Manufacturing and assembly operations will be carried on there by the subsidiary company, Lenkurt Electric Co. of Canada, Ltd.

Sales representatation throughout the Dominion will be handled by Automatic Electric (Canada) Ltd., associate of Automatic Electric Sales Co., (U.S.) which acts as sales agent for the Lenkurt parent company in the United States.

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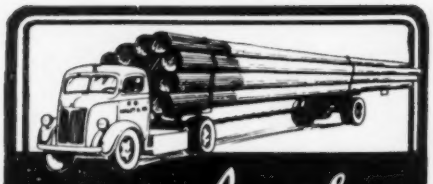

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THE BACK OF THE BOOK

By JOHN G. REYNOLDS
Managing Editor

Traffic Stopper . . . Red's the color that stops traffic, but who'd ever think that a few splashes of scarlet paint would flag down customers for a public telephone?

Even the New York Telephone Company was surprised, according to a recent article in the N. Y. World Telegram, when it stumbled on to this fact.

It all began at a New York subway station where riders were startled one day to see a telephone booth painted a bright Chinese red. According to the telephone company statistics, these startled straphangers followed their instincts and dived right into that spanking bright new telephone booth and its revenues jumped enormously.

Although the question of using color on booths has been considered for some time, the choice in this case was a happy accident. The painter had misunderstood instruction which called for a more conservative maroon.

That's the story of why several hundred bright red phone booths are spotted strategically in New York.

• • •

New Truck Driver Tester . . . A gadget called the brake reaction detonator, which measures the distance it takes a driver to brake his vehicle, is being used by the Illinois Bell Telephone Co. to test company employes. The detonator's two miniature gun barrels are loaded with .22 blank cartridges and capsules of yellow powder.

During the test, a supervisor pulls a string which sets off one shell from the detonator which is fastened to the truck bumper. A yellow powder is forced out of one barrel and marks the pavement. Sound of the shot is a sign for the driver to hit the brakes. As he does so, the jerk of the truck sets off the second shot, which also makes a yellow mark on the pavement. The distance between marks is then measured to determine the driver's response . . . To residents who wonder what the gunshots and screeching brakes are all about, the Illinois Bell reports the system may provide information that will save lives in the future.

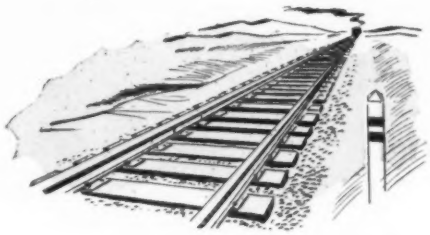
• • •

It Will Come . . . Tass, the official Soviet "news" agency, hasn't gotten around to the matter yet, but it is only a question of time. Only a question of time, that is, before we learn that a Russian discovered America and that Leif the Lucky never got far enough away from his native shores to pick up a respectable tan.

Tass has already told us that a Russian had been doing outside loops over Minsk about 20 years before those "capitalist bums," the Wright brothers, got their Kitty Hawk off the ground. We also know that the cotton gin, the steamboat, radio, radar, structural steel, penicillin and a long list of equally impressive accomplishments were of pure Russian origin.

It has always been an interesting world and it will never grow dull while Tass is doing business. We may even find out the name of the Russian who invented love.

Here's a Wood Preservative You KNOW will work

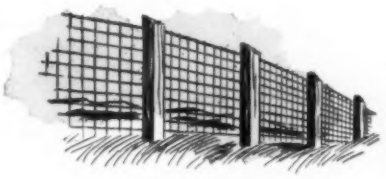


With today's high cost of lumber, it becomes more vital than ever to use a wood preservative of *proved* dependability.

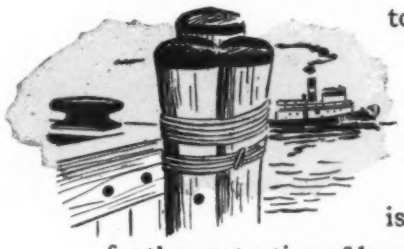
Creosote Oil meets this requirement outstandingly. It is the most widely used wood preservative in the world.

Properly applied, Creosote Oil extends the life of wood 3 to 5 times, or more. Its deep penetration protects wood from dry rot, fungi, termites and other destructive pests.

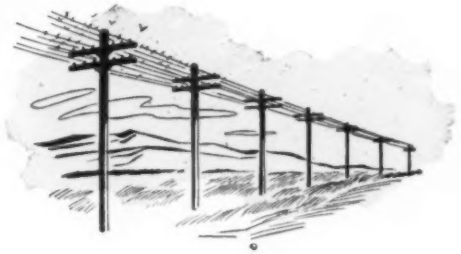
Creosote Oil is the only wood preservative that has been successfully used under practically all conditions for more than 100 years.

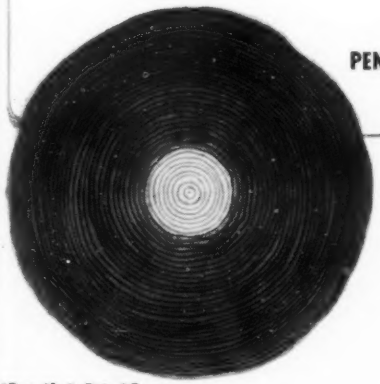


For these reasons, Barrett continues to recommend pressure treatment with Creosote Oil as the most dependable wood-preserving method for users who *must* be able to count on the results. For these reasons, also, Creosote Oil continues to be the wood preservative that is preferred by leading railroads and utilities for the protection of ties, poles and structural timber. When a demonstrably better method of preserving wood is developed, to the point where it can be recommended for the protection of large lumber investments, you may be sure Barrett will sponsor it.



Today, as for the last 100 years, Creosote Oil is the most reliable safeguard of your lumber investment.





PENETRATES to the HEARTWOOD

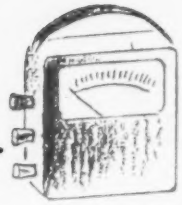
THE BARRETT DIVISION

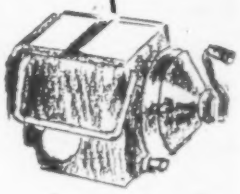
ALLIED CHEMICAL & DYE CORPORATION

40 Rector Street, New York 6, N. Y.

Barrett*

*Reg. U. S. Pat. Off.





LABORATORY REPORT

KENTON LABORATORY

To: Mr. R. K. McBerty, President

From: J. M. Blackhall, Kenton Laboratory

Subject: Summary of life test on McBerty Automatic Switchboard, Model MCX-100

The subject switchboard was shown at the National Convention in Chicago, October 15, 1948. It was returned to the laboratory where it has been on continuous life test.

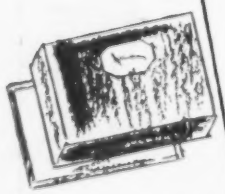
2,286,970 completed calls have been made to date - the equivalent of 9 years of normal heavy service for this size switchboard. Artificial line loops with mechanical dialing and supervision simulate actual field service as nearly as possible.

Eight cases of trouble requiring service have been recorded.

a) - 2 shorts in switchboard wiring.
b) - 1 relay armature grounded to frame.
c) - 1 relay coil with shorted turns.
d) - 1 broken weld on switchboard wiring.
e) - 2 make contacts welded on F relays.
f) - 1 make contact failure due to foreign material under armature.

The switchboard shows little evidence of wear. The test will continue with close observation and detailed daily reports. All detailed information is available upon request.

J.M.B.



July 5, 1949